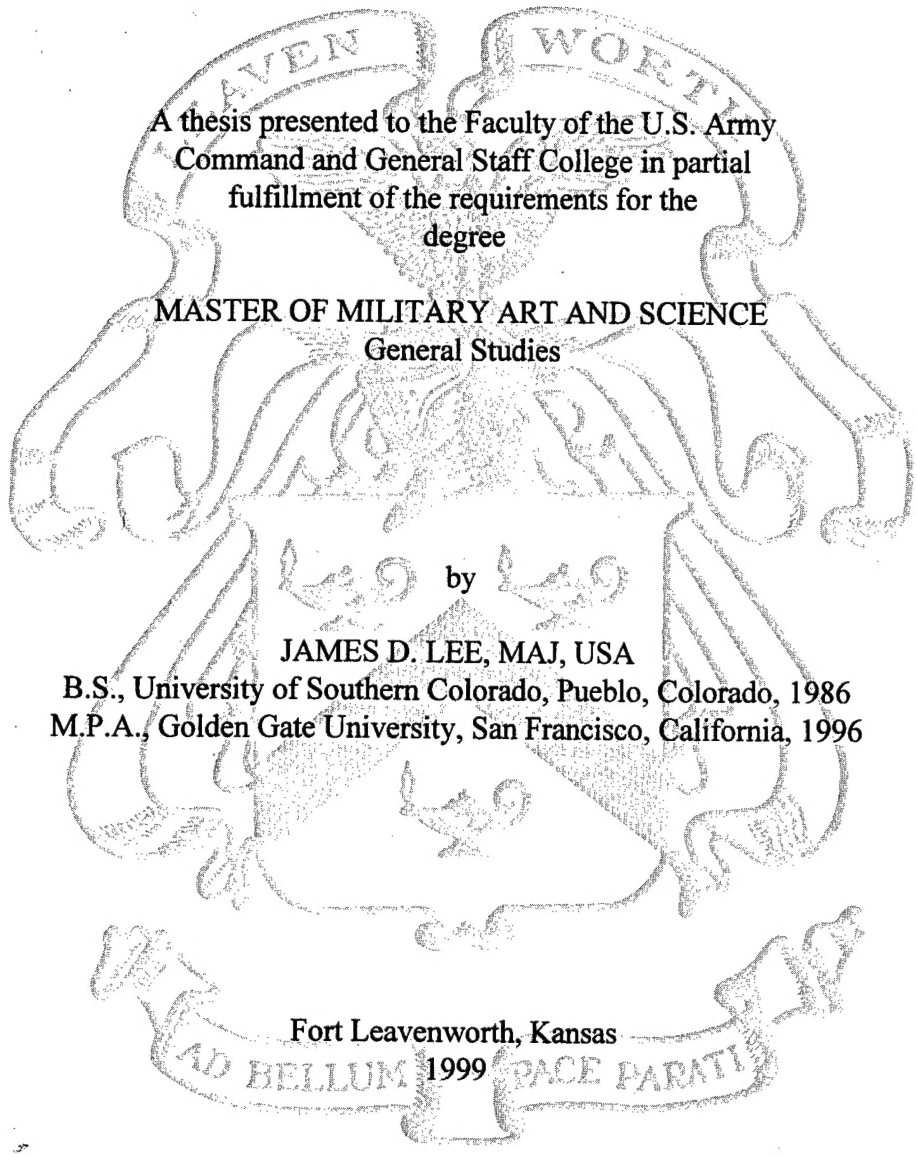
INFORMATION DOMINANCE IN MILITARY DECISION MAKING



A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

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Fort Leavenworth, Kansas
1999

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	4 Jun 99	Master's Thesis 7 Aug - 4 Jun 99

4. TITLE AND SUBTITLE
Information Dominance in Military Decision Making

5. FUNDING NUMBERS

6. AUTHORS)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
U.S. Army command and General Staff College
ATTN: ATZL-SWD-GD
1 Reynolds Av., Bldg. 111, Rm. 123
Ft. Leavenworth, KS 66027-1352

8. PERFORMING ORGANIATION REPORT NUMBER

9. SPONSORING/ MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING/MONITORING

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

12b. DISTRIBUTION CODE
A

13. ABSTRACT (Maximum 200 words)

This study considers how ABCS (Army Battle Command System) capabilities achieve information dominance and how they influence the military decision making process. The work examines how ABCS enables commanders and staffs to achieve information dominance at the brigade and battalion levels. Further, it describes how ABCS influence battle command in an expanded battlespace. A review of recent trends at the Combat Training Centers (CTCs) indicates that no great advantage if gained is realized by achieving situational awareness at the brigade level. It appears the better-trained force in execution wins on the battlefield regardless of increased awareness.

The study determined that technologies like ABCS are the first step towards producing future digitized systems that will gain information dominance for the future commander. It promotes the continued development information dominance technologies that enable a better decision-making process. It further concludes that man and battle command remain the continuity that provides ABCS its power by leveraging its capabilities at the right point and time on the battlefield. Finally, with the expanded battlespace, it identifies the problem that brigades do not have the weapons systems to influence this battlespace, hence, the current failures at the CTCs today.

14. SUBJECT TERMS	15. NUMBER OF PAGES
Information Dominance, Army Battle Command System, Military Decision-Making Process, Digitized Systems, Situational Awareness, Technologies	131
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION	19. SECURITY CLASSIFICATION OF ABTRACT	20. LIMITATION OF ABSTRACT
UNLCASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

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Thesis Title: Information Dominance in Military Decision Making

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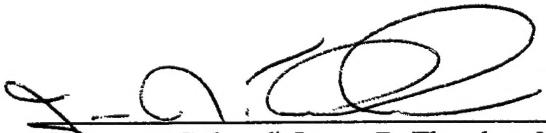
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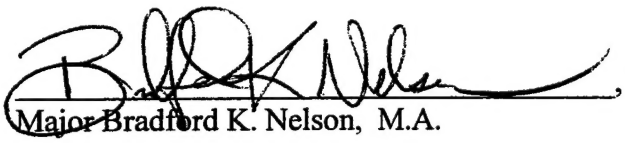
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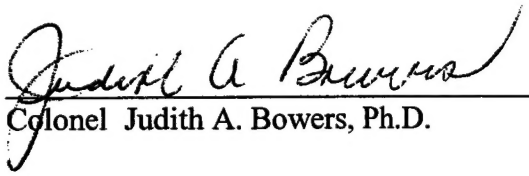
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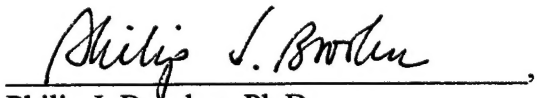
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

INFORMATION DOMINANCE IN MILITARY DECISION MAKING, by MAJ James D. Lee, USA, 122 pages.

This study considers how commanders exploit the ABCS (Army Battle Command System) to achieve information dominance (ID) on today's conventional battlefield. The work examines how ABCS is used by commanders and staffs to achieve information dominance at the brigade and battalion levels. Further, it examines how ABCS systems affect decision making. A review of recent trends at the Combat Training Centers (CTCs) indicates that advantages are gained by the using ABCS and situational awareness at the brigade and battalion level is achieved. The findings indicate that intuition and inhibition do affect the use of ABCS.

The study determined that technologies like ABCS are the first step towards producing future digitized systems that will gain ID for the future commander. The research suggests the continued development ID technologies that enable a better decision making. The data was gathered from the Center for Army Lessons Learned, CTC files--specifically, the digital rotations. Finally, with the expanded battle space, it identifies the problem that brigades do not have the weapons systems to influence this battle space, hence the current failures at the CTCs today.

ACKNOWLEDGMENTS

I wish to thank the members of my research committee for their guidance, patience, professionalism, and mentorship throughout the development of this thesis. LTC James Thrasher I have known these many years and he has been my most valuable player and friend when needing a mentor or just someone to talk to during this experience. The technical advice and guidance of COL Judith Bowers and MAJ Brad Nelson helped make this experience academically beneficial. I thank them for their assistance helping me form the content of this study.

I wish to give special thanks to Dr. Philip J. Brookes, who has provided invaluable support and teaching during the early stages of this course. His single handed efforts in teaching in excess of one hundred students the process of building a thesis is commendable.

A special thanks to the Dr. Brookes' assistant Helen and secretary Karin for their outstanding patience, guidance, and assistance. This study would not be possible without their help.

For the many valuable insights of friends and colleagues to numerous to mention who provided comment and guidance on the ideas pertaining to this work, I thank you.

Finally, and most importantly, I wish to thank my wife Gina and daughters Hannah and Francesca who have supported my efforts and forgave me for the many numerous days and nights.

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ABBREVIATIONS

AAN	Army After Next
AAR	After Action Review
ABCS	Army Battle Command System
ACE	Analysis and Control Element
ACT	Analytical Control Team
ACUS	Army Common User System
AFATDS	Advanced Field Artillery Tactical Data System
AOR	Area of Responsibility
ASAS	All Source Analysis System
ATCCS	Army Tactical Command and Control System
ATM	Asynchronous Transfer Mode
AWE	Advanced Warfighting Experiment
BCTP	Battle Command Training Program
BDA	Battle Damage Assessment
BOS	Battlefield Operating System
C2	Command and Control
CCIR	Commander's Critical Information Requirements
CTC	Combat Training Centers
COA	Course of Action
CONPLAN	Contingency Plan

CONUS	Continental United States
Email	Electronic Mail
EPLRS	Enhanced Position Location Reporting System
EMP	Electromagnetic Pulse
EXFOR	Experimental Force
FBCB2	Force XXI Battle Command Brigade and Below
FRAGO	Fragmentary Order
FFIR	Friendly Forces Information Requirements
GCCS	Global Command and Control System
IPB	Intelligence Preparation of the Battlefield
ID	Information Dominance
IO	Information Operations
IVIS	Inter Vehicular Information System
IW	Information Warfare
JDISS	Joint Deployable Intelligence Support System
JRTC	Joint Readiness Training Center
JSTARS	Joint Surveillance Targeting Acquisition Radar System
LVRS	Light-weight Video Reconnaissance System
MCS	Maneuver Control System
MDMP	Military Decision-Making Process
NTC	National Training Center
OODA	Observe Orient Decide Act

OOTW	Operations Other Than War
OPFOR	Opposing Forces
OPORD	Operations Order
OPLAN	Operations Plan
PIR	Priority Intelligence Requirement
RFPI	Rapid Force Projection Initiative
RISTA	Reconnaissance Intelligence Surveillance Target Acquisition
SINCGARS	Single-Channel Ground and Airborne Radio System
TF AWE	Task Force Advanced Warfighting Experiment
TOC	Tactical Operating Center
UAV	Unmanned Aerial Vehicle
VTC	Video Tele-conference

ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Purpose

The purpose of this study is to examine how combat arms commanders at the brigade and battalion levels exploit the Army Battle Command Systems (ABCS) to achieve information dominance (ID) on today's conventional battlefield. The research will determine how commanders apply new technologically advanced tools to enhance their decision making. The study will examine the application of Army Tactical Command and Control Systems (ATCCS) to determine how digital information is shared on the battlefield to gain information dominance. The research will study how increased situational awareness affects decision making. Finally, the research will examine the effect of inhibition and intuition during the interaction with the ABCS environment.

The Problem

Commanders throughout the history of warfare have contended with making decisions about battles based on information gained about the enemy from reconnaissance, intelligence, and surveillance assets in time-constrained environments. Army leaders are being told that ABCS is the answer to gaining information dominance over the enemy in a ground conflict. If ABCS is the answer, Army leaders must understand how to exploit these systems to gain this dominance. Sun Tzu writes, "If you know the enemy and know yourself, you need not fear the result of a hundred battles."[1] Commanders have made decisions, both good and bad, dependent upon the credibility of the collection assets, timeliness of the information, the friction on the current battlefield,

and their ability to process the information, as well as their courage, wisdom, foresight and resolution. This research will determine how to exploit ABCS and to enhance decision making for the future commander.

For the purpose of this research, when the term "commander" is used it refers to brigade and battalion combat arms commanders. If the researcher uses commander in another manner he will do so by exception

Why This Study

Current thought insists that situational awareness (SA) provides an information advantage that translates to battlefield success to the holder. The ABCS is intended to be the Army's system of systems that provides this awareness. Additionally, the new digital technology that ABCS relies upon is regarded as having the ability to expand the commander's battlespace and increase a unit's flexibility in battle. This expanded battle space will allow commanders to employ a capabilities-based force in a highly flexible yet lethal manner. The Army's direction concerning the evolution of the Force XXI battlefield is clear as stated by the Training and Doctrine Command's (TRADOC's) DA PAM 525-5, "Looking at conventional and high-intensity warfare, recent military-technical developments point toward an increase in the depth, breadth, and height of the battlefield. . . . The relationship between fire and maneuver may undergo a transformation as armies with high technology place increasing emphasis on simultaneous strikes throughout the battlespace, maneuver forces may be physically massed for shorter periods of time."[2] In the expanded battlespace, commanders hope to improve and accelerate their decisions through having increased situational awareness.

This increased awareness is achieved today by leveraging the Army's digitized family of ABCSs. Despite the technological advantages provided by these systems, some commanders appear to continue making critical battlefield errors that compromise mission objectives. The researcher will bring some clarity to the many problems that operating within increased technological environments produces and determine effective uses for the digital tools.

Situational awareness brings commanders one step closer to information dominance. General Dennis Reimer, Army Chief of Staff, writes in the 1998 US Army Posture Statement, "The data collected and experience gained clearly validated that real-time situational awareness and information dominance can provide commanders with markedly greater mobility, firepower, and survivability--all prerequisites for our future force."[3] Current thinking suggests that ID is the will determine success or failure on the battlefield of the future. Information dominance is the emerging term within the Army and will be part of the focus in this study. Simply stated, it is the difference in information known between opposing commanders. ID provides commanders the ability to accelerate their decision cycle and interdict the enemy by producing a series of tactical problems for him consequently influencing or getting inside his decision cycle. Douglas Dearth, a well-known military futurist, writes, "In addition to maintaining the element of surprise, because we immediately know the results of our application of force on the enemy, we can accelerate our response to changes in enemy activity and tailor our re-application of force to only those critical nodes that require it."[4] It appears the future battle will be fought by armies operating within resource constrained environments with

smaller yet more lethal units. ABCS is intended to enable commanders to increase their situational awareness and information dominance hence, accelerating the actions of their units towards defeating the future enemy.

Clausewitz understood the human element or inward eye that leaders bring with them to battle and the requirement for this trait remains conventional wisdom today. Clausewitz's "Coup d' oeil" best expresses this trait and explains commander's intuition as, "Coup d'oeil therefore refers not alone to the physical but, more commonly, to the inward eye. The expression, like the quality itself, has certainly always been more applicable to tactics, but it must also have its place in strategy, since here as well quick decisions are often needed."[5] Human nature and factors, such as values, reasoning, and rationalization to name a few, sometimes outweigh the information edge being provided the commander and can hinder the commander's decision cycle.

Soldiers who contend with these factors of human nature program ABCS. There exists the capability to allow the influence of these factors to be reflected in the computer output, which can distort the picture the commander sees. The Army has to learn how to train soldiers not to allow these factors to influence their interaction with the systems in order to provide a true picture of the battlefield.

Today, commanders may have a greater decision-making ability and might process greater amounts of information than their predecessors did. With the proper application of technology, commanders should be able make more decisions in a shorter amount of time and the decisions should be more informed when supported by ABCS. This research will examine how commanders are able to leverage the technologically

advanced tools, such as the Maneuver Control System-Phoenix (MCS-P) and the All-Source Analysis System (ASAS). Today's commanders may still contend with relatively the same combat decision environments. ABCS tools should provide them increased the amount of information available potentially producing information dominance. This study will document how commanders successfully apply both all-source analysis system (ASAS) and maneuver control system phoenix (MCS-P), subcomponents of ABCS, to enhance decision making.

Understanding the implications of ID is central to this work (figure 1). Two experts in their field working in the Army's Training and Doctrine Command (TRADOC) have written their thoughts concerning what ID is, and how to get it.

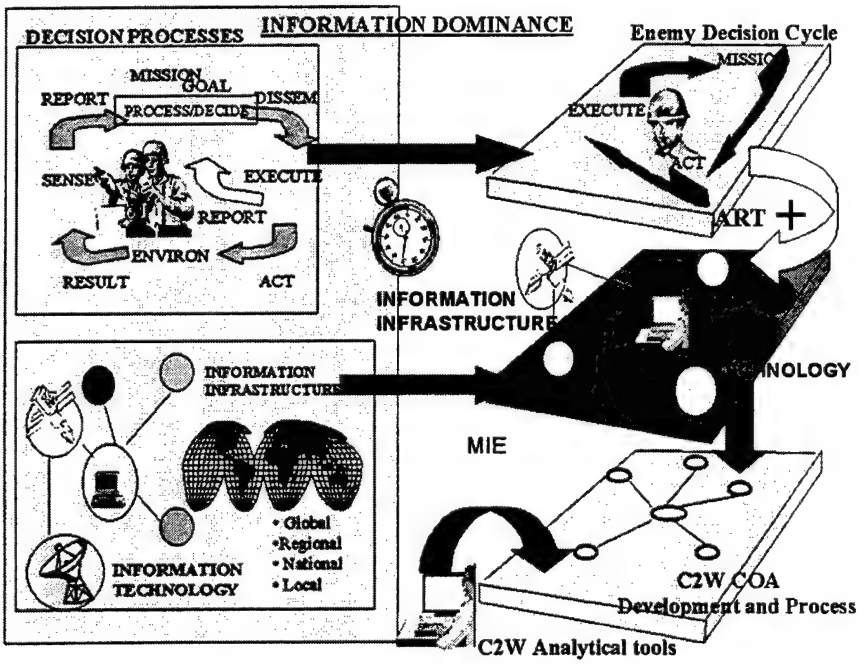

Figure 1. Information Dominance. Source: Headquarter, Dept. of the Army, FM 100-6, *Information Operations* (Washington, DC: Headquarters, Department of the Army, August 1996), 4-5.

1. ID is a condition that results from the use of offensive and defensive information operations to build a comprehensive knowledge advantage at a time, place and on decision issues critical to accomplishing the mission quickly and decisively.

2. ID is a transient condition with frequent changes over time, space and echelon that depends upon effectiveness of friendly and adversary offensive and defensive IO. Even when we possess ID, enemy forces have niche capabilities that may overmatch some aspects of friendly operations.

3. ID is a key condition requiring friendly knowledge/understanding of the situation that is significantly more certain, timely, and accurate than the adversary's. ID requires a significant disparity between what we know about our battlespace and operations within it . . . and what the enemy knows about his battlespace. If the disparity is great enough, our leaders can make timely, informed decisions, while the enemy is guessing at a decision with incomplete or erroneous information.

4. ID provides a temporary opportunity that comes from a knowledge advantage, regardless of the information source, for example, RSTA data, intelligence, governmental/nongovernmental agency, and open system information and civil/public affairs.

5. Achieving ID involves two components: (1) building up and protecting friendly information and (2) degrading information received by the adversary.[6]

These principles are a good beginning in understanding the problem, but the researcher believes there are some key factors absent. The concept of commanders taking decisive advantage in space, time, and action against an adversary to accomplish the mission is critical. This is the essence of warfighting and cannot be overlooked. The fact that ID is a relative and transitory condition of advantage dependent upon the ability of the possessor to take advantage of it. The condition of advantage will be the difficult part to identify and whether or not to act upon it even more difficult to decide. What is important is that commanders have the will and ability to act upon the condition of ID once observed.

Importance of the Study

Programs, such as Force XXI and Army After Next (AAN), are defining how the U.S. Army will fight in the future using digitized systems. William Cohen, the Secretary of Defense during the Clinton administration, states, "I have seen the future of warfare . . . . [T]he Army's ability to use information to dominate future battles will give the United States a new key to victory, I believe, for years, if not for generations to come."[7]

The Army is on a Force XXI and digitization course that may be cognitively dissonant in some key functional planning nodes. ABCS was primarily designed for conventional war and has not yet been fully adapted to unconventional conditions. For example, ASAS or MCS-P does not track ethnic populations moving from province to province, because they have not been programmed to do so. Nor do these systems provide a historical database of particular factions moving within civilian populations for the brigade commander serving in a Joint Task Force (JTF) role. Currently, ABCS cannot provide this support. Digitized systems are predetermined to define the Army's future; it is important to continually challenge the evolution of the system to ensure the end product serves its intended purpose. The Army's leaders can ensure the validity of the ABCS program by defining how these systems best enable decision making. The programs have the potential of becoming hollow as they evolve over time and as requirements documents redefine the original purpose of systems. The new innovations can build false expectations in both leaders and soldiers alike due to the exaggerated marketing pitches that precede them. The new systems can create an overreliance on artificial means numbing the more stable, functional, and fundamental warfighting skills.

Major Brad Nelson, an instructor for the School for Command Preparation at Fort Leavenworth, has observed these systems in action and states, "While we can certainly maneuver at the tactical, operational and strategic levels faster than ever, we must always balance the lightning speed of the information-processing technologies that drive our command, control, communications and intelligence systems with the real world, where there still remain soldiers, mud, gear boxes and crank shafts."[8]

Many commanders at the Combat Training Centers (CTCs) are using new technologies each month that enhance ID, yet they continue to make decisions that lead to failure in planning, preparation, and execution. This is not to say that technology is the sole contributing factor to unit failure, rather it is one area that requires further investigation.

The opposing forces (OPFOR) is not as well equipped as (MTOE) brigades and yet they continue to dominate the CTC battlefields. It appears organization, battle training and execution provide a greater advantage to a tactical commander rather than better equipment and technology. Technological advantage does not appear to replace or compensate for the need to have trained leaders and soldiers--trained in fundamental skills under realistic conditions. Colonel John Rosenberger, Commander of the 11th Armored Cavalry Regiment, OPFOR understands this issue best and states,

> How does the OPFOR develop and sustain its ability to fight and defeat its opponents in almost every battle at the National Training Center? How does the regiment, fighting with 1960s-1970s technology, routinely defeat brigade task forces equipped with the most modern weapon systems and technology our Army can provide? . . . bottom line up front: It's my conclusion , after fighting against it, observing it for 12 years and now commanding the OPFOR, that the fundamental reason this remarkable military organization is able to dominate its opponents is because the OPFOR has achieved the full combat potential residing

> in its doctrine, organization, training methods, leaders, soldiers, and the capabilities of its equipment. The brigade task forces they oppose have not.[9]

This study captures the application and uses of ABCS by commanders that provide ID and improved decision making.

Background

Army XXI and Force XXI are programs that tie together new systems that provide real-time situational awareness to the soldier and the commander. The Army seeks counsel to hear the needs of soldiers and temper its leaps so that it does not over-extend the capabilities of today with visions of tomorrow. The Army's Advanced Warfighting Experiments (AWE) are ensuring that soldiers and leaders alike can manipulate and understand the new systems, and employ them for the benefit of the commander.

How the Army manages the technological transformation of its force is critical to meeting its future challenges. The Army must not lose sight of the commander and serving his or her purpose in its path towards technological prowess. The Army's current strategy towards change of leaping ahead to maintain pace with technology must be tempered with soldier utility and requirements. As General Reimer tells, "The Army's alternative path to change capitalizes on the window of strategic opportunity by shedding the traditional incremental approach and 'leaping ahead' to build future capabilities for future challenges and opportunities."[10]

The ABCS subsystems of ASAS and maneuver control system (MCS) appear to be good systems that are the models for most militaries seeking to enter the information world. It becomes increasingly important that commanders learn their true capabilities

and how to employ them if the Army is to expect an information dominance advantage in the next battle. Too often these two systems are misunderstood and misused; hence, their value is lost in the decision-making process. Commanders must emphasize training with ABCS in all daily tasks to gain a better understanding of the full potential. The Army has captured lessons learned on these systems, and the opportunity exists today to compile these results.

Assumptions

The researcher assumes that ID is measurable. The assumption that brigade and battalions can achieve information dominance with ABCS is made. It is assumed that ABCS can enhance the commander's decision-making abilities. The effects of intuition and inhibition can be assessed. It is assumed that the ABCS provides an environment for more timely decisions with positive outcomes. ABCS helps leaders to overcome the forces of human nature and move more towards SA for mission accomplishment. The researcher assumes that increased situational awareness and information dominance support a commander's intuition during decision-making. Consequently, it is assumed that intuition effects can be captured in lessons learned. The assumption that commander's inhibition can be measured and is alleviated by ABCS is made. Lessons learned from the use of ABCS are applicable to future conflicts. Finally, the lessons learned from the CTCs and recent conflicts have captured the data that is required for this research.

The Research Question

Commanders throughout modern time have sought to gain the advantage on their enemies by exploiting information towards achieving success on the battlefield. History provides many examples of commanders that have knowingly achieved information dominance, yet have failed to exploit the advantage thus leading to mission failure. Why is it that commanders that have the information advantage failed to act in a timely manner, consequently, decreasing their probability of achieving the mission?

The primary thesis question is: How can commanders at the brigade and battalion levels exploit ABCS to achieve ID on today's conventional battlefield?

The secondary questions are:

1. What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

2. How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

3. How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

The proper employment of these systems is central to achieving information dominance on today's battlefield. How commanders enable their staffs to apply these systems is the important issue. The first subordinate question focuses on determining the advantages ABCS provides to the decision-making process. This process is the nexus from which all actions in combat come. If ABCS can be shown to provide advantage in decision making then success in combat is closer to achievement.

The second and third subordinate questions address human factors. Human nature cannot be discounted when evaluating application of systems or doctrine in combat conditions. In general, intuition is viewed as a positive factor influencing decisions and can be reinforced by the ABCS. Inhibition, on the other hand, is deemed a negative trait that blocks positive outcomes and can influence how the ABCS is employed. Each trait can in some way influence the application of the ABCS, hence, affecting the ability to achieve information dominance and success on the battlefield.

The researcher has often wondered why commanders, when given the information available to them, do not come to the correct or logical conclusion that would generally contribute to battlefield success. Commanders are risk takers playing in a high stakes game. There must exist mathematical probabilities of occurrences in battle that if applied correctly will produce positive results. When commanders add their intuitive and experiential skills to the solution it appears more positive results are produced.

Despite all its advantages and potential, ID runs the risk of becoming a panacea for poor decision making, training, and discipline in units. This panacea of expecting computers to provide the answer can lead to inaction until the combat situation demands a decision that invariably comes too late. General Colin Powell was accused of being indecisive because he demanded the perfect picture of the combat situation which some will tell you is unachievable with today's technology. The researcher fears the worst is yet to come; as the Army becomes more dependant upon ID, it is less inclined to train its forces for it will have enough preparation time. The leadership cannot become

complacent with these technologies and forget the importance of fundamental warfighting skills.

New digitized systems, such as ABCS, that provide information dominance are enablers for warfighters to accomplish objectives and not the means to an end. If Army forces cannot fight and win on the battlefield with disciplined maneuver and fires, all the information in the world will not help. It does not matter if leaders know where the enemy is and what he is going to do if they cannot gain some advantage, leverage their available combat power, and defeat him.

This research will examine how well commanders and staffs are applying the new technological tools like ABCS to better leverage their decision making abilities. It will examples of how commanders apply ABCS technology to increase their information dominance edge. Additionally, the research will address the human factors of inhibition and intuition which affect the use of ABCS.

Definition of Terms

All-Source Analysis System (ASAS). A family of systems that includes: all-source workstation, single-source workstation, compartmented automated messaging processor, and Warlord remote workstation that supports the commander's intelligence needs.

Battlefield. The area from the brigade's FSCL (fire support coordination line) to its rear boundary.

Battle Command. The art of decision making, leading, and motivating informed soldiers and their organizations into action to accomplish missions at the least cost to soldiers?[11]

Information Dissonance. The state of mind where too much information has overwhelmed the client and information is randomly discarded based on no measurable system.

Information Dominance (ID). FM 100-6, *Information Operations,* defines it as: "The degree of information superiority that allows the possessor to use information systems and capabilities to achieve an operational advantage in a conflict to control the situation in operations short of war, while denying those capabilities to the adversary."[12]

Inhibition. An inner impediment to free activity, expression, or functioning: as a psychical activity imposing restraint upon another activity.[13]

Intuition. The power or faculty of attaining to direct knowledge or cognition without evident rational thought and inference; quick and ready insight.[14]

Military Decision-Making Process (MDMP). Is a single, established, and proven analytical process. The MDMP is an adaptation of the Army's analytical approach to problem solving. The process consists of seven steps: Receipt of mission, mission analysis, course of action development, course of action analysis, course of action comparison, course of action approval, and orders production.120.[15]

Mission Success. Achieving one's objective on the battlefield for a given period or encounter.

Situational Awareness. A critical aspect of achieving a knowledge advantage over your adversary.[16]

Tactical Level. Consists of battles and engagements fought at the brigade and battalion level. These are conducted in concert to achieve operational level objectives.

Scope and Delimitations

This study's scope includes the combat maneuver brigade and battalion levels, using lessons learned captured by the CTCs during rotations that included ABCS. It captures the positive trends that units demonstrated while employing ABCS, looking specifically at the planning, preparation, and execution phases of the military decision making process. The investigation focuses on brigade and battalion level because it is the tactical level where most battles are fought. This is the most volatile part of the battlefield where battle command means most.

The research focuses on the combat arms commander because it is he who makes the most difficult decisions under conditions of extreme stress. Battle command is the most difficult of all commands and should be recognized as such.

This research covers the period that includes the experimenting of ABCS which began in early 1995 to the present. It focuses on how information technologies tied to digital technology have assisted in producing military systems that accelerate the decision-making process. For the purpose of this study this researcher is not focused on proving that a revolution in military affairs (RMA) truly exists, but rather to focus on the digitized ABCS technologies, their application, and their integration into decision making. Further, the research only addresses Army tactical level of war. ABCS is the

focus because it represents the next step in information sharing; digital technology is a leap forward in ability not soon matched on the battlefield.

Limitations

This study did not survey commanders that have recently executed rotations at the CTCs because of time constraints. The researcher did not have the time to personally find then, interview each commander who had executed a rotation in an ABCS environment; rather, the study examined the lessons learned compiled by the Center for Army Lessons Learned (CALL) and CTC after-action reviews (AARs). Additionally, the investigator did not survey or interview commanders of recent missions, such as Desert Storm, Just Cause, and Provide Comfort, due to time limitations; instead, the study analyzes the lessons learned from their published accounts. The work sought the opinions of subject matter experts from various journals and writings. The scope was narrowed to two interoperable ABCS subsystems--ASAS and MCS-P.

The researcher inexperience and limited interaction with the faculty will affect the research and limit the scope. The researcher accomplished this work in an adult learning environment with limited guidance from faculty and staff. Much of the technique used was learned from research literature in the Combined Arms Research Library.

The lack of funds to hire assistants limited the search to the internet and local libraries. This resource constraint prevented travel to the CTCs to gather first-hand information.

The lack of documentation and description of commander's intuition and inhibition will limit the research to inductive reasoning. The research will have to infer

conclusions based upon associations in circumstance between present example and classical military theory.

Time was a key limitation in this work, only being given seven months to complete research of this magnitude is barely achievable. Limiting the research to brigade and battalion levels assisted in meeting time requirements. Additionally, using the internet for many resources during the investigation helped alleviate the time problem.

Research Methodology Projected

This retrospective study covered the period from 1997 to the present. In that light only select contingencies and campaigns beginning with Desert Storm will be used for this work. The researcher envisions completing this work by December 1998. Given the NTC and JRTC lessons learned are not well organized in terms of ABCS lessons captured, the research focused on the digitally tested rotations. The information from these rotations was analyzed inductively--associating lessons learned to other like battlefield conditions. The research limited its scope to gathering advantages gained through the use of ABCS technologies in units. The researcher accepted the assessments made by observers at the CTCs, that is, when an advantage was identified, the investigator considered it to be an advantage. The researcher chose this measurement of advantage because there are so few experts in this field and the CTC observers are one of the limited expert sources.

For examples of intuition and inhibition affecting ABCS employment and performance the researcher will use CTC lessons learned for evidence. The conventional

definitions from classical military theorists, such as Carl von Clausewitz and Antoine Jomini, will be used for measurement of inhibition and intuition. The researcher understands this will lead to topics for further study because of the circumstantial connections that will require more data for future research.

Summary

The research describes the relationship between human nature, decision cycles, information technologies, and their interactions. Intuition is the basis from which commanders derive many decisions. It is based upon training, education, and experience. Inhibitions are another facet of human nature that influence the decision-making process and can affect the outputs from ABCS. Additionally, this study examines and describes how the cumulative effects of these factors influence information dominance. Using CTC AARs, the study captures examples of applying ABCS in positive ways. Finally, the study suggests applications of systems and decision processes that enable commanders to make better and more timely decisions in battle. The work examines the degree to which human factors affect the use of ABCS and how the decision-making process can enhance, mitigate, or obscure the advantage information dominance.

Therefore, as the literature review demonstrates, there has been little or no assessment of the use of ABCS in gaining information dominance--at brigade and battalion levels--focused on combat commanders on today's conventional battlefield. This researcher's objective to describe how commanders exploit ABCS to achieve information dominance is attainable. The study examines available data and describes what decision-making advantages are provided to brigade and battalion combat arms

commanders as well as the effect of the commander's intuition and inhibition on the use of ABCS.

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[1]Sun Tzu, *The Art of War*, ed. James Clavell (New York: Dell Publishing, 1983), 18.

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[3]Honorable Robert M. Walker and General Dennis J. Reimer, *United States Army Posture Statement FY99* (Washington, DC: Government Printing Press, February 1998), 30.

[4]Douglas Dearth, *Information Age/Information War, Cyber War* (Fairfax, VA: AFCEA International Press, May 1996), 13.

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[7]Walker and Reimer, 30.

[8]Bradford K. Nelson, *Applying the Principles of War In Information Operations, Military Review* (Fort Leavenworth KS: US Army Command and General Staff College)September-November 1998), 33.

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[11]TRADOC PAM 525-5, 3-4.

[12]Headquarters, Dept. of the Army, Field Manual 100-6, *Information Operations* (Washington, DC: Headquarters, Department of the Army, August 1996), 1-9.

[13]*New Collegiate Dictionary,* 1979 ed., s.v. "inhibition."

[14]*New Collegiate Dictionary,* 1979 ed., s.v. "intuition."

[15]Headquarter, Dept. of the Army, Field Manual 101-5, *Staff Organizations and Operations* (Washington, DC: Headquarters, Department of the Army, 31 May 1997), 5-1.

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CHAPTER 2

LITERATURE REVIEW

Introduction

The Problem. Commanders throughout the history of warfare have contended with making decisions about battles based on information gained about the enemy from reconnaissance, intelligence, and surveillance assets in time-constrained environments. Army leaders are being taught that ABCS is the future answer to gaining information dominance over the enemy in a ground conflict. If ABCS is the answer, Army leaders must understand how to exploit these systems to gain this dominance. Commanders have made decisions both good and bad dependent upon the credibility of the collection assets, timeliness of the information, the friction on the current battlefield, and their ability to process the information, as well as their courage, wisdom, foresight, and resolution. This research will determine how to exploit ABCS and enhance decision making for the future commander.

The Questions. The primary thesis question is: How can commanders at the brigade and battalion levels exploit ABCS to achieve ID on today's conventional battlefield?

The secondary questions are:

1. What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

2. How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

3. How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

Historical Perspective

Information dominance has been a concept that great military minds have sought to understand and apply over the ages. From Sun-Tzu twenty-five centuries ago to General Schwarzkopf of Desert Storm in the early 1990s; military leaders have sought to understand and leverage the power of information dominance as a condition that brings success. Sun Tzu believed, "By discovering the enemy's dispositions and remaining invisible ourselves, we can keep our forces concentrated, while the enemy's must be divided. . . . Hence there will be a whole pitted against separate parts of a whole. . . . And if we are able thus to attack an inferior force with a superior one, our opponents will be in dire straits."[1] The topic has reemerged as one of the Army's most important issues of the nineties. This topic demands investigation that will not only help to understand the problems of technology and decision making but also will show the relationship of technologically assisted decision making and its relevance to success and failure in battle. This research seeks to explore works that explain the application of ABCS technology in gaining information dominance to enhance combat commanders' decision making. The literary works that will be used in this research vary from the AARs of brigades at the CTCs for each digitized battle, articles published in professional journals to more nonfiction books about recent contingencies.

Current Situation

In the 1980s the Army began to realize the implications that information technology would have on the way information would be collected, shared, and applied in warfare. Heidi and Alvin Toffler had a significant role in this realization when they published *The Third Wave* which describes a technological landscape that is increasingly more complex, demanding more support infrastructure and decision by consensus.[2] If one were to use the rule of "post hoc, ergo propter hoc" or after this therefore this, one can infer that more technology in the commander's decision cycle would make him more reliant on a larger support structure or staff. If true, information dominance may complicate the commander's decision process and defeat the purpose of technology as a decision enabler. The implication, where information dominance is achieved and simplicity in the decision process is lost defeats the purpose technology was to achieve.

The Army is experiencing a technological renaissance as it moves from an industrial and forward-deployed force to capabilities based, rapid projection, and technologically advanced force that can strike quickly anywhere in the world. It prepares for an uncertain future with a plethora of contingency missions by forging ahead within an environment that includes Force XXI, Army Vision 2010 (AV 2010), and Joint Vision 2010 (JV2010). Force XXI and AV 2010 address concepts and new technologies that will facilitate new and currently unknown levels of effectiveness as a fighting ground force. Force XXI is the experimentation phase of development that will define how and with what the Army operates in the near future. AV 2010 identifies six operational patterns of combat that leverage technological advances to support them: protect the

force, project the force, decisive operations, shape the battlespace, sustain the force, and gain information dominance. The sixth pattern, gain ID, is fundamental to all operational concepts and patterns and is the one this study focuses on. Finally, these six concepts support JV2010 in bringing all services toward interoperating with one another in the future CONOPs.[3]

Digital Determinism. With the advent of Force XXI,the Army chose to enter a new era in warfighting. The new era was to revolve around digitization and automation that would provide better situational awareness in speeds unimaginable at the time. General Dennis Reimer, the Army Chief of Staff believes the Army is headed for a digital future and states, "Army XXI will be a digitized force where information technologies validated in the Force XXI process will contribute to achieving full spectrum dominance."[4] As the senior leadership began to understand the power of digitization and the possibility of near real-time situational awareness and sensor-to-shooter technologies, they became determined to provide this capability to the Army just beyond the horizon of the twenty-first century. Imagine the possibilities of such an undefeatable force on the battlefield. The leader of the future must learn to manage greater amounts of technology in complex and chaotic environments.

A Statement on the Posture of the United States Army, Fiscal Year 1999, which the Army Chief of Staff presented to Congress, discussed Force XXI, Army After Next, and Joint Vision XXI. According to *A Statement on the Posture of the United States Army, Fiscal Year 1999*, "Force XXI ties together many new information systems to provide real-time situational awareness and information dominance across the force. On

the battlefield, the digital Tactical Operations Center (TOC) integrates the various command and control (C2) systems into a cohesive set of resources. This integrated system incorporates input from all Battlefield Functional Areas."[5] (See figure 2.) The Army posture statement teaches the researcher where the Army is headed in the future in terms of technological advances. This vision will be difficult to achieve in the highly volatile environment the future brings.

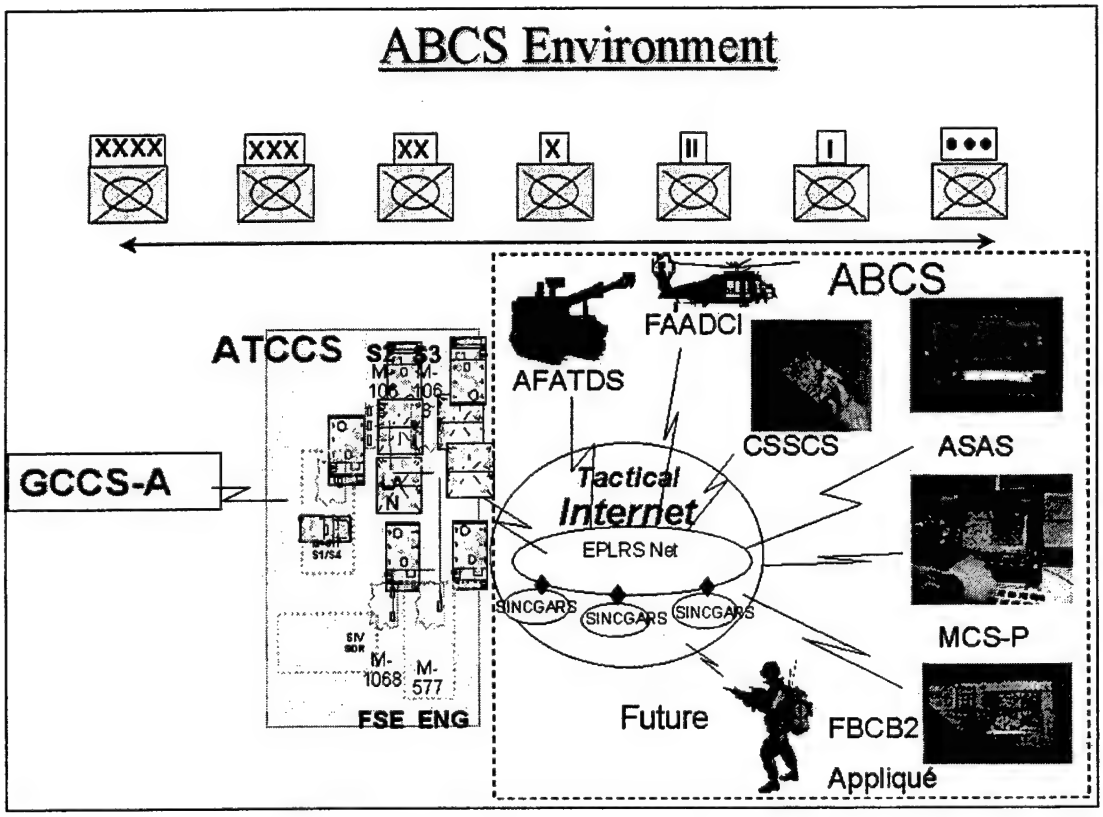

Figure 2. ABCS Environment. Source: Headquarters, Department of the Army, FM 34-25-3, *All-Source Analysis System and Analysis and control Element* (Washington, DC: Headuarters, Department of the Army, 3 October 1995), Chapter 3.

FM (field manual) 34-25-3, All-Source Analysis System, explains the ABCS and exploits the state-of-the-art sensors, processors, and communications systems to provide commanders with the technical advantages needed to meet the challenges of battle command. The ABCS provides:

1. A CHS program that supports horizontal integration between battlefield functional areas and vertical integration between echelons

2. Access to a common picture of the battlefield derived from multiple sources

3. Connectivity from tactical level to national command authority (NCA) using Army, joint, and multinational standard communications.

4. Both commander and staff with the capability to identify and satisfy the commander's critical information requirements (CCIR). ABCS consists of: (1) Army Global Command and Control System (AGCCS), which is the echelons above corps (EAC) portion of ABCS and also is the Army component of the larger joint level Global Command And Control System (GCCS); and (2) Army Tactical Command and Control System (ATCCS), which consists of battlefield functional area control systems (BFACS) for maneuver, fire support, air defense artillery (ADA), IEW, and combat service support (CSS).[6]

The BFACSs of the ATCCS shown in figure 2 provide situational awareness information and decision support to commanders and staffs at brigade through corps levels. The following systems make up the BFACS of the ATCCS: Maneuver Control System (MCS), Forward Area Air Defense Command, Control, Communications, and

Intelligence (FAADC3I), Combat Service Support Control System (CSSCS), All-Source Analysis System (ASAS), Advanced Field Artillery Tactical Data System (AFATDS).

Recent articles published in the *Military Review* on information operations provide a better understanding of how digitization influences decision making within the Army. Major Brad Nelson, an instructor at the Tactical Commanders Development Program, in his article "Applying the Principles of War in Information Operations" brings clarity to information technology's effect: "It brings a heightened ability to collect, process and synthesize data into useful information that can in turn be quickly and broadly disseminated. While the 'fog' may clear momentarily, given current battlefield dynamics, any hesitation or equivocation could negate the advantage gained by waiting for more information."[7] Major Nelson provides the foresight that describes the pitfalls of relying too much upon technology.

The Center for Army Lessons Learned (CALL) produces initial impression reports on the Advanced Warfighting Experiments (AWE) that document lessons from each exercise. These reports are designed as learning tools for the force in future experiments and will assist in writing doctrine for the new systems. They provide insights to human interaction with technology in the decision-making process. Additionally, CALL is capturing lessons learned on Experimental Force (EXFOR) brigade's tests through the Rapid Force Projection Initiative (RFPI). The lessons explain the digital implications at the brigade and below. These products helped the researcher in determining the impact of digitization on commanders and staffs at the brigade and battalion level.

The CTCs provide after-action take-home packets (THPs) for each unit going through training rotations at the centers to the CALL files. These take-home packets address each brigade attending training at the CTCs and outline in detail the accounts of each battle. These AARs are the unit's historical documentation of what actually occurred during each battle. The researcher learns that there exist conditions for success in battle. They provide insight on specific trends in the condition of battle command.

The Initial Impressions Reports from the AWEs and RFPIs provide a better understanding of future intelligence gathering systems that the Army is looking at fielding. The RFPI information provides insight into the human condition and a commander's tendency to migrate towards more visual information feeds, such as the unmanned aerial vehicle (UAV) and joint surveillance target acquisition radar system (JSTARS) terminals. On the last day of the defense-in-sector mission, write RFPI investigators, "31 July 1998, the EXFOR brigade commander fought the fight by planning and executing the battle off of the JSTARS and UAV screens throughout the night."[8] These publications, along with a host of past and present articles from various sources periodicals, such as *Military Review* and *Foreign Affairs,* provide a more than adequate base from which to examine the selected topic.

The information dominance environment is complex and overwhelming because of its enormity and only more study and writing will help define it. Two experts with the Army's Training and Doctrine Command (TRADOC) have written their thoughts on achieving ID and state:

1. ID is a condition that results from the use of offensive and defensive Information Operations (IO) to build a comprehensive knowledge advantage at a time, place and on decision issues critical to accomplishing the mission quickly and decisively.

2. ID is a transient condition with frequent changes over time, space, and echelon that depend upon effectiveness of friendly and adversary offensive and defensive IO, even when possessing ID, enemy forces have niche capabilities that may overmatch some aspects of friendly operations.

3. ID is a key condition requiring friendly knowledge/understanding of the situation that is significantly more certain, timely, and accurate than the adversary's. ID requires a significant disparity between what we know about our battlespace and operations within it, and what the enemy knows about his battlespace. If the disparity is great enough, our leaders can make timely, informed decisions, while the enemy is guessing at a decision with incomplete or erroneous information.

4. ID provides a temporary opportunity that comes from a knowledge advantage, regardless of the information source, for example, RSTA data, intelligence, governmental/nongovernmental agency, and open system information and civil/public affairs.

5. Achieving ID involves two components: building up and protecting friendly information, and degrading information received by the adversary.

These principles as outlined are the beginning but the researcher believes there are some key factors absent. The concept of commanders taking decisive advantage in space, time, and action against an adversary to accomplish the mission is critical. This is the

essence of warfighting and cannot be overlooked. The fact that ID is a relative and transitory condition of advantage dependent upon the ability of the possessor to take advantage of it is the central issue of when is the right time to decide. The condition of advantage will be the difficult part to identify and whether or not to act upon it even more difficult to decide. What is important is that commanders have the will and ability to act upon the condition of ID once observed.

Students from the Command and General Staff College (CGSC) and the School of Advanced Military Studies (SAMS) have written outstanding theses and monographs on similar subjects. Some examples of these are: "Relationship of Information to the Relative Combat Power Model in Force XXI Engagements" in which Major David Boslego describes the implications of adding the element of information to Huba Wass de Czege's Relative Combat Model that was developed in 1976. He provides insight as to the impact that information will have on the concept of combat power in the Army's 2010 model. He concludes that information, though very important, should not be considered in the combat power model.[9]

Susan Kellet-Forsyth writes in her monograph, "Commander's Critical Information Requirements," about how commanders deal with uncertainty to provide timely decision making. It examines the relationship between command and control, decision making, and information management. She provides the research with knowledge on how information overload can affect the commander and will ultimately be a factor when using ABCS.[10] All of these written works gave the researcher a better understanding of the implications of digitization and situational awareness in relation to

the commander's decision cycle. Though they do not attempt to determine conditions for success, they help the researcher better understand today's information environment.

Future Situation

Though the Tofflers write much about the future of warfare, they are not alone in projecting future societal trends. Dr. Samuel Huntington is seen as an alternative point of view to the Tofflers. He wrote "The Clash of Civilizations" in the summer of 1993 issue of *Foreign Affairs.* He characterized three "waves" as the Tofflers did, but he defines them as the civilization, agricultural, and industrial-information-ages. Unlike the Tofflers, Huntington believes the greatest flash point in societies is the cultural or religious lines. Regardless of the differences in terminology used, these authors agree that the nature of future conflicts is changing. Military leaders must be prepared to adapt to the changing world and the impending changing way of fighting. Leaders will have to be able to think for themselves and act autonomously within the higher commander's intent. The Tofflers describe this new reality when saying, "The leaders of tomorrow may well have to deal with a far more decentralized and participatory society--one even more diverse than today's. They can never again be all things to all people. Indeed it is unlikely that one human being will ever embody all the traits required."[11]

The Tofflers took the opportunity to explain the effects of the third wave on future warfare when writing the book *War and Anti-War.* This new thought on the future of warfare had the lessons learned from the 1991 Gulf War with Iraq. They realized that the first technological tools of third wave war had been seen in the Gulf War and those tools had proved to be lethal when employed against industrial-based armies. Saddam, writes

the Tofflers, "never understood that an entirely new war-form was about to change the entire nature of warfar. . . . But a radically different kind of war was also waged from Day One. The world was stunned at the very start by unforgettable television images of Tomahawk missiles and laser guided bombs searching out and hitting their targets in Baghdad with astonishing accuracy."[12] The third wave war had arrived and the enemy was unprepared. The Tofflers enable the researcher to understand the implications of technology in war and how it adds precision to the battlespace. With the use of ABCS complemented by precision-guided weapons, the commander, it appears, is given a significant advantage in lethality.

Mitchell Waldrop explains systems, components, and their relationship and effects on human actions in his 1992 work "Complexity, The Emerging Science at the Edge of Order and Chaos." He explains how complex environments become exponentially more complex with technology.[13] His writing emphasizes that mankind not only has to identify a problem, but also how to use technology to solve it. With technology comes increased speed of change inherent to computer environments, hence worsening the problem. Commanders do not need more support structures to assist them in decision making; they require tools that enable existing or smaller staffs to work more productively.

Major John Schmitt applies complexity theory and command and control in the military by describing the Newtonian paradigm. The Newtonian paradigm is, writes Schmitt, "the mechanistic paradigm: the world and everything in it as a giant machine. . . . As a clock-finely tooled gears meshing smoothly and precisely, ticking along

predictably, measurably and reliably, keeping perfect time."[14] He further explains, "Newtonian command and control thus tends to involve precise, positive control; highly synchronized schemes; and detailed, comprehensive plans and orders."[15] Schmitt's work helps the researcher understand how to better apply technology and avoid complex support structures and staffs. It is commonly known that the Army is not getting any larger; instead, it reduces in size during times of peace. The Army is not likely to support new technology like ABCS if it requires larger support structures. The researcher understands that with these new systems come an Army of civilian contractors. If these contractors must remain beyond the initial fielding of ABCS then the Army might rethink this program due to the cost in manpower.

As the Army moves into the information age,its future leaders must embrace and then harness the full potential of ABCS technologies. The dawn of the information technology age is here today, and technology grows exponentially faster with each new system designed and fielded. The Army is focusing on adapting existing systems, procedures, and techniques to take advantage of experimental ABCS information technologies. The Army continues to pursue entirely new information-based systems for the future fight. But, no matter how technology transforms the future battlefield, the one constant that remains is the human element. The Army possibly risks creating a false sense of security or false expectation as to the utility of information systems technology in combat vis-à-vis combat systems and trained soldiers. Systems that do not serve the soldier's needs and purpose may ultimately become overpriced paperweights to be discarded as so much useless trash. According to Colonel Harry Summers (retired),

"While modern technology did wonders in the Persian Gulf war, those machines would have been just so much useless junk without dedicated and courageous men and women who kept them in operation under arduous and often dangerous conditions."[16]

"The First Information War" by Alan Campen describes communications, computers, and intelligence infrastructures, as well as how they were employed and how they performed in Desert Storm. Mr. Campen was formerly Director of the Command and Control Department for the Department of Defense, and his work provided a better understanding of the effects that information systems have in a conventional war setting.[17] One sign of the growing information technology component in warfare is computerization. Campen describes, "Virtually every aspect of warfare is now automated , requiring the ability to transmit large quantities of data in many different forms."[18] Today the Army has fielded the all-source analysis system (ASAS) in every division and corps and they are able to connect to one another via satellite.

The Human Element

Commanders are products of the human experience and are subject to its inculcating certain values. These lessons are translated into human nature; this experience and values system weighs heavily on the decision-making ability of commanders and affects outcomes of the decision cycle. Decision cycle weakness is when an external force stresses their decision-making process to the point at which they act too quickly--on partial information and on emotion--and fall for deception. Successful commanders weigh the conditions of the battlefield and strengthen their decision by their intuitive skills to produce positive results. Major Schmitt, U.S. Marine

Corps Reserve officer and well-known writer on the subject of battle command, states, "cognitive research shows that proficient decision makers rely on their intuition to tell them: (a) what factors are important in any given situation, (b) what goals are feasible, and what outcomes of their actions are likely to be--allowing them (c) to generate a workable first solution and (to forego analysis of) multiple options."[19]

Similar work in this area was conducted in the mid-1980s when, then, Colonel Wass de Czege wrote several articles on the changing Army. He proposed a model that included firepower, maneuver, survivability, and a means of analyzing the factors of success.[20] Additionally, the Military Operations Research Lab conducted a study titled "Maneuver Warfare: Some Conditions Associated with Success at the Operational Level." The study concerned itself with the conditions likely to enhance the chances of achieving a breakthrough in modern maneuver warfare. The study was based upon 159 battles, which a historian assessed in terms of success criteria and thirty-two qualitative factors.[21] A comparison of these success factors with more recently observed factors from the CTCs should bear some interesting results.

Clausewitz writes much about the human condition and in particular military genius. His explanations on "coup d' oeil" are some of the most far reaching and insightful thoughts on intuition to date. His work in the area of friction and battle command is considered convention even today. His work is the basis from which many military theorists measure the human spirit.

Tom Clancy's *Into the Storm* gives a candid look into a corps commander's observations and lessons learned during Desert Storm. The goal of units in combat,

General Franks reminds us," has always been to know the enemy and to see the terrain, then to decide what to do... and to have the skills to do it faster than an enemy. The information age just provides new ways to do it on the battlefield."[22] General Franks provides the research the perspective of senior leadership that lived the Vietnam War and can bring reality of more destructive combat situations.

Summary

These references provide the researcher a challenge to critically look at the written works both internally and externally for validity to the topic. Having reviewed these works, the researcher is confident that no other current works exist that can answer the primary question as stand alone documents. The body of literature is comprehensive enough to continue the research and will answer the questions when used in concert towards that end.

The works cited in the current, future, and human element situations serve the researcher well but lack viable uses of ABCS towards achieving information dominance. None of the authors have addressed a compilation of applications for ABCS when achieving information dominance. These published works do, however, have the parts that will serve the retrospective approach to research and will answer the questions posed. There exists sufficient evidence to continue with the retrospective approach discussed in chapter 3.

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[1]Sun Tzu, *The Art of War*, ed. James Clavell (New York: Dell Publishing, September 1988), 27.

[2]Alvin Toffler and Heidi Toffler, *The Third Wave* (New York: Bantam Books, April 1981), 409.

[3]Honorable Robert W. Walker and General Dennis J. Reimer, *A Statement on the Posture of the United States Army Fiscal Year 1999* (Washington, DC: Government Printing Press, February 1998), 24.

[4]Ibid., 32.

[5]Ibid.

[6]Field Manual 34-25-3, 1-3.

[7]Bradford K. Nelson, "Applying the Principles of War in Information Operations," *Military Review* 78, no. 5 (September-November 1998), 31.

[8]U.S. Army Infantry Center and School, "Rapid Force Projection Initiative" (Draft) (Ft. Benning, GA: U.S. Army Infantry Center and School, 1998), 15.

[9]David Boslego V, "The Relationship of Information to the Relative Combat Power Model in Force XXI Engagements" (Monograph, U. S. Army School for Advanced Military Studies, Ft. Leavenworth, KS: 1997.

[10]Susan P. Kellet-Forsyth" Commander's Critical Information Requirements: The Key to a Commander's Battle Image" (Monograph, U.S. Army School for Advanced Military Studies, Ft. Leavenworth, KS, 1993.

[11]Alvin Toffler and Heidi Toffler, *The Third Wave* (New York: Bantam Books, April 1981), 404.

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[13]Mitchell M. Waldrop, *Complexity The Emerging Science at the Edge of Chaos* (New York: Simon and Schuster, 1992).

[14]John F. Schmitt, "Command and (Out of) Control: the Military Implications of Complexity Theory," *Marine Corps Gazette* 82, no. 9 (September 1998): 55.

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[16]Harry Summers, *A Critical Analysis of the Gulf War* (New York: Dell Publishing Co., 1992), 159.

[17]Allen D. Campen, ed., *The First Information War: The Story of Communications, Computers, and Intelligence Systems in the Persian Gulf War* (Fairfax, VA: AFCEA International Press, 1992).

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[19]Frank Ball and Morgan D. Jones, "Improving Marine Commanders' Intuitive Decision Making Skills" 80 , no. 1 *Marine Corps Gazette* (January 1996): 63.

[20]Colonel Huba Wass de Czege, "Preparing for War: Defining the Problem" (CGSC paper, Fort Leavenworth, KS, 8 May 1984).

[21]D. Rowland, L. Speight, and M. Keys, "Maneuver Warfare: Some Conditions Associated with Success at the Operational Level, *Military Operations Research Journal* 2, no. 3 (1996): 9

[22]Tom Clancy, *Into the Storm* (New York: Penguin Putnam Publishing, 1997), 508

CHAPTER 3

RESEARCH METHODOLOGY

Purpose

The purpose of this study is to examine how combat arms commanders at the brigade and battalion levels exploit the Army Battle Command Systems (ABCS) to achieve information dominance on today's conventional battlefield. The research will determine how commanders apply new technologically advanced tools to enhance their decision-making . The study will examine the application of Army Tactical Command and Control Systems (ATCCS) to determine how digital information is shared on the battlefield to gain information dominance. The research will study how increased situational awareness affects decision making. Finally, the research will examine the effect of inhibition and intuition during the interaction with the use ABCS environment.

The Questions

The primary thesis question is: How can commanders at the brigade and battalion levels exploit ABCS to achieve ID on today's conventional battlefield?

The secondary questions are:

1. What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

2. How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

3. How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

Research Approach

This retrospective study assesses how commanders at the brigade and battalion levels exploit the ABCSs to achieve ID on today's battlefield. Gaining a better understanding of how to use ABCS and how that use affects the commander's decision making process is important to the researcher. The purpose of this study is to examine how combat arms commanders at the brigade and battalion levels exploit the Army battle command systems (ABCS) to achieve information dominance on today's conventional battlefield. The research will determine how commanders are applying new technologically advanced tools and how they affect their decision making. The study will examine ABCS digitized systems to determine how commanders share information on the battlefield to gain information dominance. The research will study how increased situational awareness affects the decision-making environment. This work will determine how combat arms commanders' decision making is affected by achieving information dominance when using ABCS.

Overview

Having completed the research the author amended the methodology to explain how the findings were discovered and used. The researcher was not sure where the study would lead and what the outcomes would be, but the results were very interesting and will be useful to future combat commanders. The data collection was tedious because it requires an examination of data from hundreds of pages from CALL files on the National Training Center's (NTC's) brigade battles involving ABCS. Additionally, the task

required that the researcher attempt to measure conditions that enhance information dominance by the application of ABCS that result in positive battle outcomes.

When beginning, the researcher believed based upon initial readings and findings in CALL databases that the initial questions and conditions listed could be answered and measured. However, this was not the case. The first assumption that one can measure and compile data that express such subjective concepts that deal with the human factors, may have been naïve. This was proven when the researcher began to look past the initial information and found that very little data was available in the NTC files on how intuition and inhibition affect the use of ABCS. There was, however, much written on the art of "battle command" and on factors that seemed to influence battle command. The CTC AAR files though full of lessons learned and daily accounts lacked the accuracy in numbers of accounts or lessons required to tabulate ABCS usage throughout rotations in fiscal year 1998. The files did include the types of battles and the accounts of decisions being made and the ramifications for them, but little to do with ABCS and technology enhancements. The most useful account of ABCS on the battlefield was the file on the March 1997 rotation. Much of the data for this study were taken from that file.

After some research and guidance the author found that the retrospective method would serve the study best given the type of information that was available. In December of 1998 the methodology clearly evolved into a retrospective method vice the historical and analytical survey methods. In December 1998, the researcher was able to narrow the primary and subordinate research questions to ABCS. Though ABCS began in the late 1980s, the systems were not being tested until the mid-1990s, and there was little data

available on technologically enhanced brigades from the 1980s to mid-1990s. In fact the best information on technologically enhanced battle systems is most available beginning in 1995 when ABCS was being tested with the newer tanks and infantry fighting vehicles (M1A1 Abrams, M2 Bradely). At this same time more capable reconnaissance systems in the 1990s became part of the collectible data that supported ABCS.

The retrospective method allowed the researcher to collect lessons learned from the Advanced Warfighting Experiments, systems initiatives, and battle staff training programs. The analysis examined how commanders used ABCS in their decisions to influence the battle. In 1997 the Task Force Advanced Warfighting Experiment (AWE) was executed with marked success which is the first brigade and battalion test of ABCS in the field. This became the basis for the research and findings.

The Steps Taken

The retrospective method allowed the researcher to assess the meaning of advanced warfighting events using ABCS and to project their impact in the future. The researcher used the after action review (AAR) files from CALL databases as the primary source of information for comparison of events in battle situations. Due to the time and funding constraints the researcher found that the use of the Internet was most productive.

Step 1. The research began in the Combined Arms Research Library (CARL). The CARL's automated card catalog proved very beneficial and provided all the book references required for background and ABCS used in recent conflicts. The automated periodical index was used to find all the latest articles written on the subject. It was in this index that all the latest battle command and decision making writings from the

various military services were found. The search engines on both the catalog and periodical index proved to be very helpful in the search for recent examples of information dominance, information technology in battle command, and information management in the decision making process.

The researcher used the third floor of the CARL extensively. There resides a most valuable pair of research assets--the two research librarians that assist students are invaluable. The two librarians with the researcher's guidance, searched for all the latest monographs, theses, and classified writings on the subject. Additionally, the field manuals on the third floor were the most current versions found to date, this became especially important in finding the most current Force XXI doctrine, DA PAM 525-5.

Step 2. The research focused primarily on gathering all information relating to the employment of ABCS in support of the decision making at the brigade and battalion levels. The information the researcher sought to examine was on brigades and battalions employing ABCS systems on a realistic battlefield. This work required access to the CTC file rooms in the Center for Army Lessons Learned (CALL) databases. The researcher had to get password authorization from the CALL system administrator. The CTC files are available to personnel that are conducting research or to CALL personnel. The researcher was able to attain a password within two weeks and began collecting data. However, the investigator soon found a lack of specific data in the CTC AAR file rooms, and what was available would have been too subjective for the study.

Step 3. The researcher used the Internet to examine all rotation's AAR files from the NTC from 1997 through 1998. The researcher began at the beginning of 1997

and searched each brigade's AAR file for applications of ABCS systems. The files were found to be incomplete with some rotations missing. More importantly, the AARs and lessons learned were poorly written from the perspective of capturing ABCS applications. Not having found but two rotations that addressed ABCS, the researcher chose to use the CALL database search engine in hopes of finding other rotations that may have had ABCS used. Not surprisingly, the search did produce results in the March 1994 rotation. These lessons learned were found to be dated because the systems had evolved so rapidly that they did not equate with the systems used in 1997.

Step 4. Using the Internet again, the researcher accessed the TRADOC homepage for digitization. TRADOC's homepage was open and did not require password to enter. At the TRADOC homepage the researcher found much of the information required. Additionally, the homepage had all the connections/links to all the ABCS program managers. Still using the Internet, at the program manager's homepages, the researcher was able to find the operational requirements documents for each system that outline exactly what the systems are required to do.

Step 5. The researcher then accessed the 4th Infantry Division's (Experimental Force) EXFOR's homepage on the Internet. The EXFOR produce lessons learned from each of their exercises using ABCS. Theirs is the most current information on the application of ABCS on the battlefield at brigade and below.

Step 6. Once all the initial research data was gathered, it was organized into three categories: information technology theory, decision making, and battle command. The researcher began reading all the information available on information technology theory

to better understand the implications of such things in warfare. The books and periodicals were the greatest source of information in this area.

The researcher incorporated Brigadier General Wayne Hall's visit to CGSC as it was timely and provided the researcher with much information to think about in information operations. Most of the theory information was used to formulate the introduction and background portions of Chapter one. Some of this information you will find as corroborating evidence in chapters four and five.

Step 7. At this point the researcher wanted to get more technical by proving or disproving that ABCS technology affected seven standard conditions of the battlefield. The researcher wanted to use the analytical survey method to collect specific measurable data on the conditions of the decision-making environment that resulted in positive battle outcomes. The first subordinate questions would be answered using this method. The research would determine if the predominant conditions that enable commanders to leverage technology for positive results exist. There was no intention to build a case similar to that of Dupuy's 1984 empirical study.

In order to address the first subordinate question, What decision making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels? the investigator needed to collect quantitative data on positive battle outcomes. However, there was not sufficient time or manpower to replicate Dupuy's study so the investigator decided to identify and count repetitive trends of positive applications of technology in the examples available.

The researcher believed the data for the study would come from thirty to fifty brigade level operations. The search was limited to the battles fought during NTC rotations in 1997 and 1998. During 1997 there were eleven rotations in which there were five to eight brigade level battles fought in each rotation. However, there was limited data actually available, so the investigator turned to another source.

The data that initially will be considered will be discrete data because they seem to stand alone. The scale of measurement of data sought would be nominal. Nominal data is correct in that the conditions or variables are distinguishable and separate. The data would be collected in a spreadsheet format and applied to several different display models to better understand the influence of each condition. If time allowed, the research would relate the separate conditions to each other and display the results. The use of these types of data and their subsequent manipulation would provide thought-provoking leads to more interesting conclusions and avenues for research.

Because of the lack of specific data in the CTC file rooms, this approach was not pursued. There were some findings in the CTC files that the research could have derived some relationship to the conditions for measure but this would have added too much subjectivity.

The researcher decided to pursue a more general approach due to the lack of empirical data. The positive lessons learned on application of ABCS systems in all Advanced Warfighting Experiments became the focus. The research captured all the lessons learned in positive employment of ABCS relative to gaining information dominance. If the application of ABCS led to gaining information dominance it was

noted for inclusion into chapter four. Additionally, the proper examples of ABCS employment were categorized by the phases of the military decision making process: planning, preparation, and execution. This method was used to add clarity and utility to this work for commanders in the field that may want to read it. The reader should see the military decision making phases lessons learned very clearly in the findings.

Step 8. Finally, using the information identifying positive outcomes of ABCS employment, the researcher, applied the knowledge gained from the periodicals on battle command to emphasize the human element focus of this work. This portion of the study was the only way to relate the concepts of inhibition and intuition to the application of information technology systems like ABCS. The findings in these readings were applied as objectively as possible to show the relationship of ABCS to the human aspects of command.

Analysis

Determining Advantage. In addressing the first subordinate question the researcher has to determine how to identify advantage. Given the limited data available, the researcher accepted the written assessments made by the observer controllers. When searching through all the lessons learned the researcher took the observers notes that advantage was achieved if the observer noted it in a particular battle. No formal measuring formula was used the researcher simply gave credit to advantage when presented in the reviews. The advantages were only used if they were related to the commander's decision-making process. The advantage was given credit if in any way it

served the commander's decision. For example, staff support to the commander's decision was considered an advantage.

Intuition. In determining the affect of intuition on the use of ABCS lessons learned were used only when the observer noted the commander's mental state during a particular battle. Intuition was credited in the application of ABCS if the commander was observed making decisions in compressed time events such as execution of battle. The researcher used more conventionally accepted definitions of intuition from such theorists as Carl von Clausewitz. Additionally, the researcher sought more current research and writing to support the data in this area.

Inhibition. In determining the affect of inhibition on the use of ABCS lessons learned were used only when the observer noted the commander's mental state during a particular battle. Inhibition was credited in the application of ABCS if the commander was observed making decisions in highly stressful situations. The researcher used more conventionally accepted definitions of inhibition from such theorists as Carl von Clausewitz. Additionally, the researcher sought current research and writings on the subject for supporting data in the area.

Summary

This retrospective study was designed to examine the application of ABCS gain information dominance at the brigade and battalion levels using records of brigade and battalion experiences at the CTCs and AWE. The research relied on the retrospective method in searching the CTC AAR files via the Internet. Additionally, conditions of

battle command are studied for their relevance in the technologically enhanced decision-making process.

The researcher identified examples of ABCS application applied as seen during each CTC battle. Battle command was examined from the perspective of how inhibition and intuition affect the use of information technology like ABCS. Relating the ABCS with battle command the research determines how commanders at the brigade and battalion levels exploit ABCS to achieve ID to effect better decision making. As the findings in chapter 4 indicate ABCS does provide an advantage in decision making, hence, providing conditions for information dominance as well as indicating that intuition and inhibition having both positive and negative effects on the use of these systems.

CHAPTER 4

ANALYSIS

Introduction

ABCS digital technology is designed to move information faster and with higher resolution using less signal band width around the battlefield. ABCS increases situational awareness to affect the commander's decision-making ability on the battlefield.

In this work the researcher uses the term "commander" to describe brigade and battalion combat commanders and will by exception address other commanders specifically by title.

This research found commanders making some of the same decisions as in the past though the credibility of the asset, timeliness of the information, has improved. Commanders can make better decisions through gaining increased situational awareness; however, as the study shows, at the brigade and battalion, level there are differences in levels of awareness and ability to act. The data for this work are from the Task Force AWE conducted in March 1997, at the National Training Center (NTC). The task force referred to as the Experimental Force (EXFOR), was a brigade combat team of the 4th Mechanized Infantry Division, stationed at Fort Hood, Texas. The EXFOR brigade consisted of an armor battalion, a mechanized infantry battalion, a light infantry battalion, and various support units. The units participating used 873 digitized platforms including all the ATCCS.

Purpose

The purpose of this study is to examine how combat arms commanders at the brigade and battalion levels exploit the ABCS to achieve information dominance on today's conventional battlefield. The research determined how commanders apply new technologically advanced tools to enhance their decision making. The study examined the application of Army Tactical Command and Control Systems (ATCCS) to determine how digital information is shared on the battlefield to gain information dominance. The research studied how increased situational awareness affects decision making. Finally, the research examined the affect of inhibition and intuition during the interaction with the ABCS environment.

Questions

The primary thesis question is: How can commanders at the brigade and battalion levels exploit ABCS to achieve information dominance on today's conventional battlefield.

The secondary questions are:

1. What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

2. How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

3. How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

Findings Evaluated

The findings are predominantly based on NTC rotations and the lessons learned from 1997 and 1998. During the research, it was determined that units have been training with only portions of ABCS and the lessons learned on those systems was not being captured in an organized manner. This made it very difficult for the researcher to collect data for interpretation. Given the lack of specific data the research changed to a retrospective approach to gathering advantages of ABCS. Rotation 97-06 or Task Force Advanced Warfighting Experiment (TF AWE), however, was very useful because lessons learned were captured using a more organized approach, and the lessons focused on the ABCS. The Task Force XXI AWE, observation team's focus was stated as, "The crux of AWE and the FXXI systems is information dominance through new technology. Twenty-five observations were collected by CAAT members on information systems in four areas: 1) Managing Information Systems; 2) Required capabilities for future versions; 3) measures for maintaining information systems; 4) techniques and procedures developed by the 4th ID TAC personnel to employ new systems."[1]

The findings from Rapid Force Projection Initiative (RFPI), conducted at the Joint Readiness Training Center (JRTC), that tested new information collection platforms that interact within the ABCS infrastructure helped describe system advantages. The Battle Command and Battle Staff Training Team (BCBST) notes were found to be helpful in refining the "how-to-operate" piece of the research problem.

Decision-Making Advantages

What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

The decision-making advantages in battle sought by combat commanders are being achieved by leveraging the capabilities of ABCS. The advantages provided by ABCS are positive breakthroughs and result in compressed timelines and accelerated decision cycles. Combat commanders do not contend with the same combat decision environments today; combat is more accelerated and volatile as will be discussed later. The ABCS environment provides commanders increased situational awareness and an information dominance advantage that accelerates decision cycles. The accelerated decision environment is so because digitized systems provide more opportunities to influence the battlespace. The findings in subsequent sections will illustrate successful applications of ABCS that increased situational awareness and information dominance and that consequently, led to better decisions.

Situational Awareness Advantages. Today, the situational awareness provided by ABCS is unequaled and unprecedented. (See figure 3.) Information dominance is achievable at the brigade and battalion levels and it is what commanders do with it that is important. This ability to take action on a more compressed timeline creates a dynamic of its own. Now that commanders have more timely and accurate information on the enemy they tend to become captivated by the mode of presentation and type of the information, that is, video feeds. The urge to act on the information is stronger than before because the fog of war is not as severe. Colonel Grazioplene, Commander of

Operations Group (COG) at the NTC noted during the TF XXI AWE, a key tenet for future battle command. "We must be careful to dominate information otherwise it dominates us."[2]

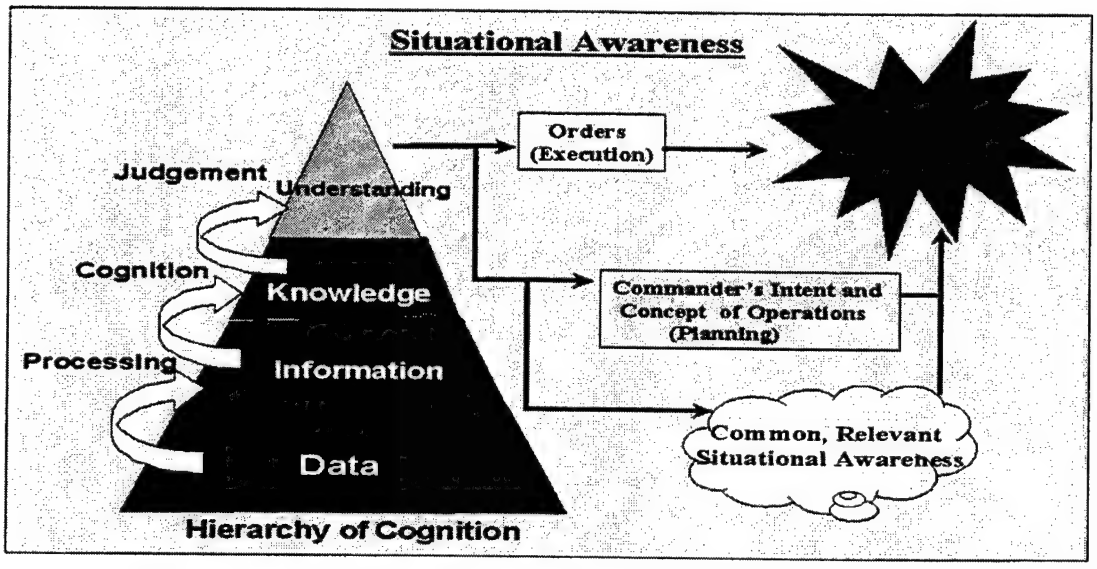

Figure 3. Situational Awareness

"The Blue situational awareness capability was somewhat more effective in this AWE than in the past," reported Mr. Robert Holcomb, US Army Operational Test and Evaluation Command (OPTEC), Director Operational Test and Evaluation (DOT&E), conducting independent evaluation of the Army's Battlefield Digitization Program, "with about 75 percent of the platoons visible at the battalion command post--'visibility' as

used here means at least one of the platoon's vehicles completed 10 or more situational awareness updates each hour, averaged over all training days as seen by the instrumented applique at the battalion command post. This capability was again widely regarded by the test unit as being very valuable to them, but the poor performance of the tactical internet precluded taking advantage of it."[3] This capability provides greater visibility of the battlefield and enhances SA.

Information dominance, is a fleeting and transitory state of being at the brigade and battalion levels. The definition of information dominance is subject to varied conditions influencing each level at which a unit operates; brigades do not sense or detect the same conditions as battalions as company etc. The digitized systems enable commanders differently to influence the types and amount of information known about the battlefield. OPTEC's research reported, the message completion rate for applique message traffic, including overlays, was under 30 percent, which was too low to demonstrate the premise of the hypothesis, that is, achieving digital connectivity horizontally and vertically within the force. The digitized force did outperform the baselines in the employment of tactical air support, attributable to the presence of an applique-like system in the aircraft. The final battle of the AWE resulted in a significant Blue victory, which was attributable to the excellent performance of the attack helicopters during the battle.[4] The digitized, situationally aware ability increases the capability to defeat the enemy at greater distances with better reconnaissance assets and within accelerated timelines due to the new opportunities to decide actions produced by the same assets. A cautionary note; the battle at the brigade and battalion level is more difficult

because though the information systems capabilities increased the weapons systems did not. Though brigades and battalions have the ability to achieve greater awareness of the battlefield, they do not necessarily have an increased weapons ability to influence the same.

Information Dominance Advantage. ID achievable for short periods of time at the brigade and battalion levels with today's technological capabilities. In comparison to past examples of intelligence never reaching the warfighter; the 24th Infantry Division and 82nd Airborne Division in Desert Storm showed that processed intelligence can reach the brigade level in a timely manner. The commander of the 82nd Airborne, Major General Steele, shared his thoughts on the utility of ASAS in providing unprecedented intelligence support to the decision makers. "I have witnessed a revolution in intelligence support since the transition to ACE and ASAS. . . . [I]t is apparent that ACE is long overdue and is the key to tactical fusion and a truly seamless intelligence architecture. The concept is a reality in the 82nd and we are not looking back, only ahead to realizing the ACE's full potential."[5] This is a significant change in warfighter's perception from past intelligence dissemination failures.

Recently, the 4th Infantry Division at the Task Force Advanced Warfighting Experiment (TFAWE) conducted at the National Training Center (NTC), soldiers again proved that information dominance can be achieved. "The situational awareness provided by this new technology is without equal," noted NTC senior observer controllers, "Being able to immediately display all enemy positions, as intelligence sources locate them, and simultaneously share this information with other cells of the

TAC provides the digitized division with data for faster and smarter decisions."[6] The observer-controllers (OCs) determined that the brigade did gain the information advantage over the Opposing Forces (OPFOR). Though there was a decided advantage it was determined that the information if not used or acted upon is fleeting and transitory at the brigade level. This same information becomes less useful over time at the battalion level. When the information delta is achieved, leaders must take advantage of it or by an act of commission wait for a better opportunity. "Waiting for a better opportunity, however, comes with risk and must be weighed accordingly." Mr. Robert Holcomb, as part of an independent research team on ABCS, researching digitization effects, reported, "An associated observation is the tendency for leaders to hesitate before acting, in the expectation of getting 'better' information if they just wait a little longer. Such tendencies could be dangerous if not corrected in training. Another observation is the increased opportunity digitization provides for micro-management of subordinates, stifling initiative and boldness."[7]

Commanders must approach these systems application with caution because they can present misleading information. There are examples in the Experimental Force (EXFOR) exercises where commanders and staff become captivated by the fidelity of information they are being provided. They can become enamoured with the presentation and forget that it must be analyzed and taken advantage of, or the opportunity is lost. The relevant common picture (RCP) over time can lose its relevance because if the intelligence and operations databases are providing information from different time lines the synchronization is lost. These near real time (NRT) systems are only real time in

their transmission abilities and not necessarily in their analysis. There is lost time in analysis and posting of databases. The possibility exists that an operations picture is one hour old and the intelligence picture is three hours old; this is neither real time nor relevant.

OODA Loop Advantages. The OODA (orient, observe, decide, act) loop, a concept developed by Air Force Colonel John Boyd to train fighter pilots in air-to-air engagements. This technique is credited for increasing Air Force fighter pilots decision cycles and consequently their survivability in air combat. Some combat commanders during preparation and execution phases of battle will be required to act under compressed timelines and decide branches and sequels of a COA (course of action) more often in the increased awareness environment. As technology provides the warfighter a greater awareness of the environment and conditions on the battlefield decision cycles will inherently become compressed. Can the Army transpose this process and make it fit in with or complement Army's Military Decision-Making Process (MDMP), some believe it can. Commanders during preparation and execution phases of battle will be required to act under compressed timelines and decide branches and sequels of a COA more often in the increased awareness environment. As technology provides the warfighter a greater awareness of the environment and conditions on the battlefield, decision cycles will inherently become compressed. The Army's challenge is, when and with what response/reaction to take given the information being provided. Digitized technologies, like ABCS, give leaders a new power for visualization which increases the opportunities to act; given this ability, leaders need to ask, just because we can act should

we act. It is the classic "Jurassic Park" syndrome and I paraphrase: You were so amazed and impressed with your new found ability and technology that instead of asking, Could you? You should have asked, Should you? The same applies to the application of OODA to battalions, brigades, and other echelons. Unlike the fighter pilot, the Army commander or staff does not and should not act each time they OOD. For strategy sake it is better to set the conditions for the brigade battle by engaging the enemy at the correct point and time. The tendency of the immediate gratification culture is to act upon information and continue acting upon it until the desired endstate is achieved. Currently, brigade and battalion commanders do not have the required resources to fight in such a dynamic OODA environment but could have them soon.

The OODA process for the Army is more applicable at the company to section level. This level is generally fought at the one- to three-kilometer ranges and requires such decisive action. Additionally, companies and below have the resources to influence this battle space. As Force XXI and Army After Next (AAN) weaponry is developed and fielded, commanders at the brigade and battalion levels will be capable of resourcing deeper targets with complementary effects. Until weapons, such as Crusader (howitzer), Commanche (attack helicopter), and laser designator sensor-to-shooter systems are fielded and trained, processes like OODA must wait.

During TFAWE, NTC rotation 97-06, both the division and brigade staffs employed a number of new technologies in the conduct of operations.

> Applique and the Army Tactical Command and Control System (ATCCS), combined with direct feeds from intelligence systems, such as Unmanned Aerial Vehicle (UAV) and Joint Target Attack Radar System (JSTARS), were the most

> significant. At the brigade level, it appeared from watching their observation posts in battle and then subsequent AARs, that very little benefit iInformation) was gained that contributed to operational success. Technical difficulties certainly affected the brigade, but despite the situational awareness provided by Applique, the speed of the battle seemed to be dictated by the OPFOR. The high level of training present in the OPFOR and thorough knowledge of the terrain, effectively negated the brigades advantages, inherent in the situational awareness provided by applique.[8]

Acceleration Advantage. As commanders are introduced to the ID environment they will be faced with more complex situations that require more decisive action. The ABCS technology affords the commander a deeper look into the battlefield with greater clarity. This technologically enhanced service comes with a price. Commanders will be required to think more critically and be able to increase the expanse of their battlefield visualization and battle command acuity. Additionally, commanders decision cycles are accelerated by the increased situational awareness. The benefit is the increased speed that the enemy commander is now subject to. This is commonly known as getting in the enemies decision cycle. In the ID environment commanders increasingly act and react until the battle culminates. This phenomenon is created because as commanders see the battlefield deeper with increased fidelity, they will act on it more. This action will cause an enemy reaction, and in turn creates a counteraction. "Information Technology (IT) enables leaders," writes Major Mark Malham and Master Sergeant Debra Gabbard, Program Executive Office-Ground Combat and Support Systems, "for example, to reduce crew workload, conduct automated command and control (C2) on the move and obtain automated targeting. It decreases decision-making timelines, enabling warfighters to operate inside the enemy commander's decision-making cycle."[9] Increased situational

awareness produces this environment and commanders will have to develop acute battlefield visualization skills that can keep pace with a new volatility and velocity.

Alvin and Hiedi Toffler foreshadow the next war with visions of high-velocity warfare and thinking versus brute force leadership. "General Schwarzkopf 's famous sweep around the western end of Saddam Hussein's main defenses. . . . Apparently no one on their (Iraqi) side believed that the allied ground troops could advance at such high speeds. This increase in velocity of warfare . . . was spurred by computers, telecommunications, and significantly, satellites. . . . Unprecedented speed was evident in many other aspects of the Third Wave war. . . . But the issue in battle is not necessarily absolute speed, but speed relative to the enemy's pace."[10]

Decision-Making Steps. The Army uses the seven step Military Decision-Making Process (MDMP) during planning, preparation, and execution phases of operations. During the three phases of operations the combat commander attempts to gain information dominance in his battlespace. ABCS is applied during all three phases to gain ID and staffs will leverage the systems to increase the level of dominance.

Situational Awareness (SA) provides a common understanding of the commander's assessment of the situation and includes: commander's intent, and commander's concept of the operation, combined with a clear picture of friendly and enemy force dispositions and capabilities.[11] Situational Awareness should be maintained throughout the operation's phases. During the initial phases of planning and preparation SA is maintained by continually sharing the MDMP results as each step is accomplished. This form of maintaining friendly SA can be accomplished via ABCS and sharing

operational graphics through File Transfer Protocols (FTP) or by providing text messages. The VTC used during the planning process has significantly improved and accelerated the MDMP process. It improves MDMP because the time commanders and staffs used to spend on their vehicles traveling they now spend in VTCs sharing ideas. "The whiteboard VTC is an effective tool in synchronizing operations," noted NTC observer-controllers, and further explain, "In conducting a synchronization meeting for the F-hour sequence for a division deep attack, the Deep Operations Coordination Center (DOCC) used the whiteboard VTC. . . . This proved effective as all concerned could talk off of the same picture and interact effectively to synchronize the operation."[12] This capability saves an enormous amount of time for the planners who are accustomed to waiting for critical decisions.

Receipt of Mission. During the TFAWE, planning phases, it was noted that the MDMP supported by VTC whiteboard technologies is the future Tactic Technique and Procedure (TTP). This TTP made collaborative planning possible rather than the old linear parallel planning process. "The visualization process still requires the ability to rapidly display overlays from support cells at the battle captains location. A VTC whiteboard over the ATM (Asynchronous Transfer Mode) has replaced the old system of calibrated overlays from various staff cells."[13] This TTP provided increased advantage for planners who have waited for a higher headquarters to finish their plans prior to beginning theirs. The capability alleviated travel times between Tactical Operations Centers (TOCs) significantly reducing planning time. The convention of the "one-third

two-thirds" paradigm of staff time management was enhanced and rendered more realistic with this ability.

During the planning phase several echelons of headquarters put out guidance and tasks to subordinate units. During this phase the interoperability of ABCS subsystems reduces communications time and allowed simultaneous SA. The ability for these systems to communicate through Asynchronous Transfer Mode (ATM) allowed staffs to share information in a near real time manner. This meant as higher headquarter staffs plan. the lower echelons can keep pace with their efforts and have a 70 to 80 percent solution soon after higher headquarters' plan is complete. "The battle captain must have the ability to see the graphics from all the cells over the VTC collaborative planning with distance locations. While some current software in the different information systems can exchange graphics, there is not a single common graphics software that provides ATM format whiteboard capability in ATCCS (Army Tactical Command and Control System)."[14] Though the system has faults, it was found to be extremely useful in coordination meetings. "This tool (VTC whiteboard) consisted of a monitor that continuously displayed up to three inset pictures of the other VTC participants in the top right corner of the screen. . . . This proved effective as all concerned could talk off of the same picture and interact effectively to synchronize the operation. Confusion as to routes, enemy locations, targets, etc. was eliminated."[15] This technology has not fully matured, however, and requires further testing and implementation for future success.

CCIR Advantages. ABCS produces advantages in sharing of critical information during the planning phase. The most critical information in MDMP is called

Commander's Critical Information Requirements (CCIR), and this information is shared between echelons. Normally, the CCIRs are developed during mission analysis, refined during wargaming, and presented during the decision brief. Doctrinally, CCIRs are found in the operations order (OPORD) under coordinating instructions. The CCIRs need to be shared with all subordinate commands as soon as possible because they provide a focus of effort in the planning phase. Using the old method of dissemination, staffs would expect to develop the CCIR during mission analysis and in the OPORD briefing. This is too late in the process for the collaborative planning method to be useful.

Using ABCS in the FXXI model sharing CCIR is simplified and more timely. Technology provides the ability to keep staffs/subordinates collection and analytical efforts focused on the relevant CCIR. "The MCS system is used to pass the CCIR to other staffs and echelons of command. . . . The ATCCS are used by most staff cells to pass their subject matter information to other cells, and the G-3 for inclusion on MCS, as appropriate."[16] The Advanced Warfighting Experiment produced several relevant trends on information sharing.

1. The ability to send digital CCIR and other ATCCS generated information through MCS provides a rapid distribution system to staff cells and other echelons of command, provided the recipients have communications continuity with the sender.

2. The use of MCS with Army Global Command and Control System (AGCCS) adds a new dimension to passing CCIR to other forces (Marines). AGCCS translates digital messages from MCS into message format compatible with other joint theater

command and control systems like the Joint Maritime Command Information System used by the Marines.[17]

Targeting Advantages. During the targeting process, ABCS was found to be highly valuable during the "decide" function of the planning phase. Generally, the targeting process at brigade level begins when each level of command is assigned an Area of Operations (AO). Once the AO is assigned and threat evaluation has begun the FSO (Fire Support Officer) huddles over the map with his new piece of land and threat, determines the best way to influence the battle. Once the FSO's targets are approved by the commander he passes the targets to higher headquarters. All of this is normally done with a High Payoff Target List (HPTL) and very limited real time intelligence to speak of. The targeting meeting is always the last meeting the night before the battle where FSOs, S3s and commanders review targets one last time until the early morning hours.

Targeting takes on an entirely different nature under FXXI by using ABCS. The process is streamlined and requires fewer group-targeting meetings. The EXFOR finds there are specific ABCS systems that help the deep-planning process and include: (1) In observing meetings of the targeting team/DOCC (which for all intent and purposes for the EXFOR are the same), it is clear that several features of the ATCCS will be of great assistance in the targeting team/DOCC process. (2) For the simple act of briefing during the meetings, the ATCCS provided a clear, easy to read display for the various aspects involved, for example, All-Source Analysis System (ASAS) picture for the S-2, Forward Area Air Defense Command and Control Intelligence (FAADC2I) for the Air Defender. (3) FAADC2I is invaluable to the aviation brigade for analyzing air routes. The brigade

can easily position enemy air defense systems and view their fields of fire, dead space, and others. And (4) the G-2 has created a home page on the LAN; accessible over SINCGARS that provides some level of security that contains pertinent information of value to the division. Specifically, In this case they were posting feeds from the Unmanned Aerial Vehicle of the deep attack target area and routes in and out of the Battle Positions.[18] It appears that ABCS and ATCCS have the capability to provide near real time interactive information for targeting staffs while dislocated but in a synchronous environment. ABCS is capable of simplifying the decide function of the targeting process by linking dislocated staff cells for a common planning step in a collaborative environment. This synchronous ability in an expanding battlespace was valuable in bringing staffs and commanders together in a difficult and expanded battlespace.

Wargaming Advantages. Visualizing the battlespace is one of the most important tasks commanders and staffs need to grasp. If they can see the battlefield then visualize the effects of terrain, weather, and enemy actions, they are able to plan the mission more thoroughly. The EXFOR brigade staff was able to test the Battlefield Planning Visualization (BPV) system with positive results. The BPV was observed to enhance the brigade's MDMP in three areas: (1) providing enhanced visualization of the area of operations through virtual reality and Reconnaissance Intelligence Surveillance Target Acquisition (RISTA) assets; (2) automated the analysis of the military aspects of terrain as they related to the battlefield functional area under consideration; and (3) animated friendly and enemy courses of action to identify risk, synchronization issues, possible branches and contingencies, and to conduct pre-execution rehearsals with commanders

and key personnel during the preparation phase.[19] Wargaming is one of the most important parts in MDMP, and BPV allows units to wargame multiple COAs. Most units one finds rarely wargames multiple COAs due to limited time and resources; BPV overcomes these limitations to an extent.

ABCS does provide information dominance in the planning phase even if it simply through synchronizing the friendly situation or providing an enhanced visualization of the terrain and possible enemy actions. As the technology matures and the soldiers and leaders with it so will the dominance quotient.

Preparation Advantages. The preparation phase begins with the orders brief and ends at H hour or when the unit initiates action. This phase is a highly volatile period of the operation requiring extensive coordination. The preparation phase as in the others is able to achieve information dominance through the use of ABCS in several areas. It is this phase that establishes the conditions for success during execution.

Rehearsal Advantages. The preparation phase focuses on visualizing the battlefield while conducting final preparations for the execution phase. The brigade rehearsal is one of the most important events to the commanders and staff. They are used to ensure that every primary leader understands their task and purpose- and commander's intent. The rehearsal demonstrates the understanding and actions required to achieve synchronization. The staff prepares for the rehearsal for a number of hours and sometimes will even rehearse the rehearsal. This is one event where the entire chain of command is watching the performance. The BPV was observed being used to visualize actions that would be helpful in the rehearsal. "The BPV was used to support several

staff cells in the planning and analysis phases of the TDMP. The G-2 was able to animate the three enemy courses of action outlined in the Division (52nd Mech) OPORDER."[20]

The new three-dimensional terrain view of the battlespace proved useful for the same purpose. "The 1st BCT and brigade recon troop commanders, as well as the aviation brigade used this virtual reality terrain visualization to conduct rehearsals using the BPV as the ultimate sand table prior to conducting the deliberate attack, inserting reconnaissance assets, and a deep attack respectively."[21] This capability saves hours of work in sand table and rehearsal preparations. Additionally, it provides a more realistic view of the terrain that enables commanders to envision the impending battle.

Visualization Advantages. Applique' is a prototype version of the FBCB2 (Force XXI Battle Command Brigade and Below). It is a Command, Control, and Communication (C3) system that is focused on providing situational awareness through computer centric technologies and is a subcomponent of ABCS. The system is both a horizontal and vertical C3 system designed to share echelon specific information that is capable of being filtered. This capability of keeping all staff cells informed of preparation status during this phase is a major break through in synchronization skill enablers.

The system allows staffs and commanders to share vital information on combat status much faster and without the requirement of constant monitoring. Old techniques would require someone to be engaged either on the radio or phone to take such reports. Sharing orders is now simplified through the use of the "Orders Request" hot button. A staff can now retrieve or request Fragmentary, Warning, Operations orders, LOG calls,

and MEDEVAC request. Overlays can be retrieved using the "overlays" hot button and depicted on screen for collaborative planning. Making applique available from platoon to corps levels is a major break through in situational awareness. This brings the Army one step closer to information dominance and should pay great dividends in the future. "The Bradley Commander, Tank Commander, or dismounted infantry leader needs a C3 system that can send reports, request information, receive orders, show operational graphics, portray enemy and friendly disposition on the battlefield, show areas of NBC contamination, obstacles and minefields, and graphically portray that BOSs on the map--applique can do all that."[22]

Information Management Advantages. Three types of information express the Commander's Critical Information Requirements (CCIR), they are Priority Intelligence Requirements (PIR), Friendly Forces Information Requirements (FFIR), and Essential Elements of Friendly Information (EEFI). CCIR are designed to keep the staff focused on information that best answers the commander's questions that lead to decisions. These information requirements are considered critical and meet the following criteria:

1. Applicable only to the commander who specifies it
2. Directly linked to present and future tactical situation
3. Situation dependent
4. Events or activities that are predictable
5. Specified by the commander for each operation
6. Time-sensitive information that must be immediately reported to the commander, staff and subordinate commanders

7. Always included in an OPORD or OPLAN

8. Transmitted by communications system specified in the SOP[23]

The 4th Infantry Division employs a technique that uses ASAS the intelligence automation system to share the CCIR with all staff elements and subordinate commands. The Division was able to share the CCIR down to battalion level through the use of Remote Work Stations (RWS) in the S-2 Intelligence staffs. Once the CCIR are received in the RWS they are shared with the other staff cells. "The 4th ID Commander's Critical Information Requirements (CCIR) were disseminated via the All Source Analysis System (ASAS) Remote Workstations (RWS) to subordinate units on a tactical internet home-page which substantially reduced dissemination time, and ensured that all users had equal access to division level analysis of incoming intelligence."[24] Digital dissemination of CCIR is reduced to a fifteen to twenty minute drill and once completed has informed all commanders and staff in writing within the division. The capability of posting mission essential information on a tactical, secure internet home page is a major breakthrough in information sharing. In the past staffs either sent messengers, called information over a radio or more recently faxed information to one another. The new capability allows commanders to quickly share the most critical information in the least amount of time.

Today commanders and staffs must be able to see the battlespace with a common appreciation of the conditions influencing it. The Relevant Common Picture achieves this awareness where each staff element share their situational and relevant information with each other. "Information-age commanders face dramatic new decision-making dynamics not matched by current deliberate decision-making staffs. Accelerated

operational pace over expanded battlespace dimensions in the DAWE drastically changed staff battle rhythm and outstripped abilities to provide the customary detailed, mechanical decision-making support to commanders. Instead, future commanders will see the virtual battle space digitally and simultaneously make multiple on-the-spot decisions."[25]

RWS, UAV, and R & S. The Unmanned Aerial Vehicle (UAV) is proving to be a great reconnaissance asset in the R&S plan. Its capability is unprecedented in long-range unmanned reconnaissance. The combat arms has always struggled in getting eyes on the target or at the point of contact with the enemy in time to establish conditions for success. The problem has been losing half a scout platoon trying to get eyes at the critical point on the battlefield through forced recon. The UAV link to the Ground Control Station (GCS) and Remote Video Terminal (RVT) within the TOC has answered the call. Evaluators on the Rapid Force Projection Initiative (RFPI), conducted at the Joint Readiness Training Center (JRTC), have concluded that the UAV is a viable R&S asset for the brigade level. "The Hunter Sensor Suite (HSS) displayed a clear and precise image of the battlespace on the operator's monitor during the hasty defense. The HSS crew targeted a landmark with the forward-looking infrared, calculated the grid, and transmitted the image and its grid coordinates to the Light Digital Tactical Operations Center (LD TOC) (Brigade Main Command Post) over the Lightweight Video Reconnaissance System (LVRS). The entire process took approximately ten minutes to execute and provided a visual image of a long-range 'target' situation to the LD TOC."[26] This technology is capable of achieving in mere minutes what used to require numerous hours and in excess of twenty men and several vehicles to accomplish in a mediocre fashion. Observer Controllers noted the

following key observations for the use of UAV and their employment towards achieving information dominance.

1. The HSS crew demonstrated the ability to provide the literal "directed telescope" for the commander for targets at long-range when the system had line of sight. This new capability expands the commander's ability to visualize his battlespace at selected times and places.

2. The brigade commanders directed that operators learn to focus the UAV on specific portions of the objective area in order to confirm the enemy template. For example, if all of the BMP locations in the templated MRPs have not been located, it is imperative to continue the search in the most likely or suspected areas in order to confirm the enemy sit template by a specific vehicle and equipment count.

3. UAV operators should look in specific places for specific things, keep an accurate count of target acquisitions and Battle Damage Assessment (BDA), and then the staff confirms the situation template.

4. The EXFOR brigade made excellent use of the UAV feed by using it to recon all of the proposed Landing Zones (LZs) prior to insertion, vectoring in the Apaches on acquired targets, and also overwatching/conducting surveillance of the LZs during insertion.[27]

The UAV is proving to be one of FXXI's most valuable players due to its great utility in all phases of the battle. The GCS and RVTs inside the TOCs will undoubtedly prove to be an integral part of the ABCS infrastructure. Like any other asset, the UAV must be focused and directed to address PIR. Additionally, the information that the

sensor package provides needs to be accurately interpreted by trained analysts and not become a "play station like toy" that the commander tries to joystick around the battlefield. When commanders fly/micromanage UAVs they stop doing their jobs, leading.

Execution Phase. The execution of battle is the most exhilarating phase when properly prepared. General Fredrick Franks believes, "Most often failure is caused by resistance to change in war-fighting ideas, the use of the wrong ideas, or a lack of preparedness--and, as we've seen, preparedness comes through tough performance-oriented training that gives soldiers and units battlefield experience even before combat."[28] Bringing together the synergistic effects of fires and maneuver requires great skill from commanders and leaders. These are the times when leaders make instantaneous decisions based on experience, knowledge, and preparation.

ABCS is the system that enables commanders to see this battlefield from a common perspective. The common perspective is key, in that it enables commanders at different levels to combine their combat multipliers to achieve a more synergistic effect in destroying the enemy. It is the synergism and complementary effects of various systems that will allow the smaller more capable force to achieve success against a larger force on the future battlefield. The complementary effects are not achievable without increased situational awareness. ABCS is the technology that will provide this capability in the future. "The Army Battle Command System (ABCS) was conceived to field a vertically and horizontally integrated force that wold allow warfighters to share a

common battlefield view. . . . Therefore, they can dominate battlespace by synchronizing combat operations, concentrating force effects and preventing fratricide."[29]

The Hunter Sensor Suite (HSS) with the Lightweight Video Reconnaissance System (LVRS) provides the commander a greater range of observation than before experienced. Deeper strikes and complementary effects are closer to achievement with this system. The Rapid Force Projection Initiative (RFPI) at the Joint Readiness Training Center (JRTC), evaluates this concept and has observed positive results in UAV uses towards greater SA. "Normally, 'deep' obstacles (usually emplaced by GATOR or Air VOLCANO) are of limited use since they are not observed and can be fairly easily breached by enemy advanced reconnaissance elements . . . the LVRS could allow the brigade to emplace obstacles to support the deep fight."[30] JRTC observers reported, "The HSS crew demonstrated the ability to provide the literal "directed telescope" for the commander for targets at long-range when the system had line-of-sight. This new capability expands the commander's ability to visualize his battlespace at selected times and places."[31] This solves half of the commander's problem; now that he can observe greater distances he must be able attack them. Synergy requires that the battle staff have available assets that can complement the observation effects.

Pilots using the Ground control Station (GCS) in the Analysis and Control Team (ACT) that is collocated with the brigade TOC control the UAV. The feed provides a real-time video downlink of the target area. This same video feed is being seen at all TOC RVTs and imported to FBCB2 for increased situational awareness. The UAV is highly survivable and provides a most valuable reconnaissance asset. The system was

tested at the NTC and received favorable marks. "During the course of the first three battles . . . the Hunter and GNAT UAVs have flown nearly 70 hours on 11 different missions. . . . Throughout most of the rotation, the UAVs were flown wherever and whenever the controllers wanted. The enemy knows that they are up there and have stepped up their effort to shoot them down. . . . If the hunter flies at greater altitudes (above 10000 AGL), the enemy IR (SA-9/SA-14/SA-13) air defense threat is virtually eliminated."[32] UAV provides the observation portion of the complementary effect sought in synergistic operations. The missing complementary effect in this case is the fires portion. Currently brigades do not have weapons that can reach these great distances. In the future brigades will have to be given weapons with increased ranges to complement the observation capabilities.

Reconnaissance. During the planning, preparation, and execution phases the Reconnaissance and Surveillance (R&S) plan is being executed. The R&S execution is a critical event that occurs during this phase because it confirms or denies both friendly and enemy COAs. It can determine whether to a friendly COA is sound based on the enemy COA that is being confirmed. "An effective leader's or staff reconnaissance can assist significantly in developing COAs. Conducted early in the planning process, it can help confirm or deny the commander's and staff's initial assessments."[33]

The RWS has been tested in the R&S support capacity and was found to be lacking in utility. The system does not allow the brigade to conduct dynamic tasking to the subordinate Battalions or assets. The ASAS RWS requires an upgrade in order to improve collection management utility at the brigade and battalion levels. The RWS

software needs to execute requirements management, mission management, and asset management functionalities for brigade staffs to get full utility from the system. "The effect of Force XXI technology on the preparation of the R&S plan is limited. RWS software does not support preparation of the R&S plan."[34] Future developments will require the system to perform intelligence requirement modifications, asset status, and review mission status, add a mission and other collection management tasks.

Battle Staff. Though ABCS provides the commander increased SA and at times information dominance, they still require a well-trained battle staff. The battle staff brings to the chaos interpretation of information that provides the commander solutions for better decisions. The future will demand that staffs become more flexible, intelligent, thinking, and resilient to meet the needs of the battlespace.

The FXXI staff will be dependent upon a smaller, tailorable, deployable, force projection combat unit. The centerpiece of these types of forces will be the brigade level unit, which will be the fundamental building block of the Mobile Strike Force (MSF). The nexus of this requirement is the changed nature of contingency missions and the uncertain future. "The MSF will have greater organizational flexibility than today's divisions. Its structure will not be fixed and could be tailored by adding functional modules or combat, combat support, and combat service support. It will be organized around force package modules that will facilitate tailoring the force package to the mission. It will be capable of task organizing, detaching, and deploying stand-alone brigades tailored to specific missions."[35] This new combat unit is to be the punch that accompanies the new situationally aware commander and staff. The MSF will have

greater range and lethality to interdict the enemy at greater distances complementing ABCS.

With increased capabilities in range, lethality and precision, commanders will require more accuracy from their staffs. The increased awareness among commanders has the possibility of regarding the staffs input less and commanders coordinating directly to achieve a common goal. Commanders that have access to this visual environment will tend to make decisions without staff consultation. This theory supports the OODA loop concept and produces faster actions, but has the potential to miss read critical information.

> At the unit After Action Review (AAR) following the first defense in sector mission on 28 July 1998, JSTARS was universally praised as very reliable by all personnel at the Brigade Main Command Post and at the Brigade's ACT. . . . On the next day of the same defense-in-sector mission the JSTARS in the LDTOC (light digital Tactical Operations Center) ACT was moved, along with the operator, to be closer to the Brigade Commander. The Brigade Commander wanted to use it for targeting purposes. This showed how much stock the commander put in the system. . . . On the last day of the defense-in-sector mission, the EXFOR BDE CDR fought the fight by planning and executing the battle off of the JSTARS screen and a UAV screen throughout the night.[36]

This is the problem with providing commanders too much awareness, they become more involved than they should be and tend to discount the role of the battle staff.

Today, on the rare occasion that a brigade plans and executes a deep strike it will require the support of aviation assets. FAADC2I is one of ABCS's primary components looking deep into the enemy's rear area when looking for enemy air. The battle staff tracks both friendly and enemy aircraft using FAADC2I. The system is currently limited by range and the brigade relies on the AWACs for deeper coverage in support of aviation

attacks. This system will allow attack aviation engage the enemy deeper in the rear while the battle staff maintains SA and early warning for the commander. "Situational awareness was increased to and extent by FAADC2I. The screen was able to monitor the Advanced Quick Fix in real time as it flew on station and the attack birds as they flew into the Forward Arming and Refueling Point (FARP). The attack birds flew too low to be acquired on radar as they crossed the line of departure (LD)."[37]

Effect of Intuition

How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

The findings indicate that human nature and factors, such as values, reasoning, and judgment, do affect the information in ABCS being provided the commander. As Ardant du Picq, so eloquently states, "Man is the fundamental instrument in battle." Commanders are demonstrating a greater decision-making capacity that process greater amounts of information than their predecessors did because the technological tools enable them to do so. Commanders are showing the ability to make faster decisions because enabled by digitized technology, their staffs are able to clarify greater amounts of information and present it in a more cogent and clear manner. These findings are described in the subsequent decision-making paragraphs. The researcher wants to caution the reader because this ability is only achievable when staffs and combat commanders are trained well to use these new implements; without proper training failure is inevitable. With the proper application of technology, commanders are able to process the increased amounts of information. For example, Maneuver Control System--Phoenix (MCS-P) and

All-Source Analysis System (ASAS) provide the Relevant Common Picture (RCP) to both commanders and staffs that allow them to operate more autonomously as a unit.

Battle Command. Successful commanders command from the front where they can best experience the conditions affecting their soldiers on the battlefield. General Fredrick Franks, one of recent history's successful commanders believes, "Battle Command is decision making. The commander will visualize the present friendly and enemy situations, then the situation that must occur if his mission is to be achieved at least cost to his soldiers, an then devise tactical methods to get from one state to the other (which is what leadership skill is all about)."[38] "Genius consists in a harmonious combination of elements," reminds Clausewitz, "in which one or the other ability may predominate, but none may be in conflict with the rest."[39] Today this is visualization and a commander's vision of the future fight--requiring that "coup d' oeil" or intuition that Clausewitz wrote of. "Many theorists of war have employed the term in that limited sense," writes Michael Howard on Clausewitz, "But soon it was also used of any sound decision taken in the midst of action--such as recognizing the right point to attack, etc. Coup d' oeil therefore refers not alone to the physical but, more commonly, to the inward eye."[40]

Today commanders position themselves forward in the battlefield in High Mobility Multipurpose Wheeled Vehicles (HMMWVs) or armored fighting vehicles to enhance their visualization. In either vehicle you will find the latest addition to the ABCS family, the Force XXI Battle Command Brigade and Below (FBCB2). The impetus for this system was the requirement for commanders to be horizontally integrated

on the battlefield as noted by General (retired) Fredrick Franks, Commander VII Corps in Operation Desert Storm. It was observed that commanders in today's combat environment do not fight from TOCs, rather, they will be found forward in their fighting vehicles leading. This requirement for combat, combat support, and combat service support information sharing gave way to FBCB2. The project managers translated this requirement into a system that integrates all these capabilities to provide increased situational awareness (SA).

"Situational awareness is the key enabler for planning, executing, rehearsing, and training for mission with faster more reliable information and for making decisions inside the loop of the enemy. Enemy location/situation data received must be displayed accurately . . . the best operational decisions are made with recent/accurate information."[41]

FBCB2 currently has been tested in a prototype applique form at the NTC and produced favorable results for a proof of concept. "The Applique feed is from vehicle mounted EPLRS (enhanced Position Location Reporting System). The UAV feed is also a display accessible . . . the most commonly used service is the JSTARS feed . . . the applique provides near-real time visual information of the battlespace."[42] Commanders today and in the future will have these types of heads-up displays to synchronize their battles with giving them increased ability to leverage the OODA loop decision cycle. Without this SA commanders cannot fully achieve the OODA loop decision theory because the "act" piece will rarely be conducted in unison to accomplish the complementary effect required.

Leaders trusting their intuition today when confronted with such powerful visual tools and overwhelming amounts of information are brave indeed. The very nature of ABCS and abilities like situational awareness and information dominance enhance commander's intuition. According to MAJ Todd Sherrill, based on his research on entropy and battle results, suggests that a commander can achieve mission success with a moderate amount of information, but he can do so more "efficiently" (fewer casualties, lower fuel and ammunition consumption) with more information.[43] This implies the more information a commander has about battle conditions the less he relies on subjective conditions.

It is not that simple, history has many examples of commanders who have had more information and superior numbers and still lost the battle. In these same examples the e commander's intuition prevailed, and the victor was the lesser informed smaller force.

Major Schmitt, USMCR states cognitive research shows that "proficient decision-makers rely on their intuition to tell them: a) what factors are important in any given situation, b) what goals are feasible, and what the outcomes of their actions are likely to be--allowing them c) to generate a workable first solution and (to forego analysis of) multiple options."[44]

If true, these cognitive skills when correctly integrated with ABCS technology will be a winning combination and provide victorious effects given similar battlefield conditions. Some of the of these skills and types technological tools were applied in the unfortunate destruction of Iran Air Flight 655. In this incident 290 civilian passengers

lost their lives to a misapplication of this process aboard the USS *Vincennes* while patrolling the Persian Gulf. Was this a misapplication of what seems to be a sound process or was this commander and crew in the wrong place looking for a fight? There are other cases that appear to be the antithesis of technology enhancing intuition, one year earlier the USS *Stark* finds itself in a similar predicament. The USS *Stark* is involved in the heat of combat engaged in gunboat battles that morning of the incident. The crew is receiving conflicting transponder emissions, the flight is not responding to their warnings of air space violations, inexperience, and biases to the littoral area and hostile acts and intentions of the morning all play in to the final act, destruction of a commercial airliner. The intuitive skills were operating at peak levels, and the technology was working but not in the way expected. Were these flights on commercial flight lists? Did the Combat Information Center (CIC) instruments indicate attack postures of the aircraft, altitude, aircraft bearing, and ascending or descending attitude? These kinds of conditions have to be measured in the heat of the situation. Nevertheless, two airliners were shot down with civilian casualties all due to a misapplication of technology and intuition combined. This does not bode well for relying just on intuition and ABCS technology for victory, man is the key and man must inevitably decide in the end. Recall the example of the commander that slowly migrated his situational awareness to the video screens of JSTARS and UAV, and think, how can commanders decide the actions of hundreds of men from what they are seeing on a computer screen. Colonel Stephen Garret writes, "Intuitively, commanders are planning future operations as they take action on what they see unfolding throughout the battlespace."[45]

Effect of Inhibition

How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

"A great part of the information obtained in war is contradictory, a still greater part is false, and by far the greatest part is of a doubtful character. What is required of an officer is power of discrimination, which only knowledge of men and things and good judgement."[46] What Clausewitz said on information in war during his time remains conventional wisdom today. Information's value is dependent upon the source and the analyst reviewing it. With technology playing such a large role in information gathering and processing systems it is critical that all systems be governed correctly. Mistakes can occur from the source/collection platform or at the analyst level. Each mistake made adds to the friction equation of battle and degrades the information dominance value more.

Collection systems collect what they are designed to--mistakes come when information users misinterpret the data or try to task the system to collect something it is not capable of doing. Technicians can exaggerate the true capability and minimize the technical limitations that build false expectations which lead to self-fulfilled friction. Additionally, as soon as you add the human factor of analysis a degree of subjectivity is added to the equation and objectivity/accuracy is lessened. As Clausewitz observed many years ago, "As a rule most men would rather believe bad news than good, and rather tend to exaggerate the bad news. The dangers that are reported may soon, like waves subside; but like waves they keep recurring, without apparent reason."[47]

If ABCS is to work then commanders must gain confidence in the technology and trust it, and a great part of this confidence comes from knowing the capabilities. "After the first battle," noted observer controllers during the TF AWE, "Brigade AAR participants stated that they had questioned the reliability of the enemy situational template, and had hesitated to act upon it. The FXXI systems and analysts at the DIV TAC did an excellent job in depicting the enemy situation, and the MCS-P version compared favorably to 'ground truth' as depicted by NTC's unique Sun System. In addition to lacking full confidence in the information the systems provided, occasionally the brigade failed to use information because it could not be fused into another supporting system or turned into a usable product."[48] Commander's inhibitions can have a negative effect on the performance of technology when the soldier/operator senses distrust, hence, soldier performance is lessened.

Inhibition is known to have an impact upon how information is perceived. The friction of war causes one to alter information in different ways; some may put a positive light on bad information and others the opposite. Others simply make mistakes based upon experience in similar situations. Man must remain fluid in thought to grasp the complexity that faces him in the new battlefield. "The influence of great diversity of intellectual qualities is felt chiefly in the higher ranks," writes Clausewitz on intellectual quality, "and increases as one goes up the ladder. It is the primary cause for the diversity of roads to the goal and for the disproportionate part assigned to the play of probability and chance in determining the course of events."[49] Today, those unfamiliar with new technology systems have the tendency not to trust what is being shown them. This

tendency exists because the consumer/user of information is unfamiliar with the system's capabilities having not used it before. Martin van Creveld, writes on command in war, "Any given technology has very strict limits. Often, the critical factor is less the type of hardware available than the way it is put to use. Specifically, since a decisive technological advantage is a fairly rare and always temporary phenomenon, victory often depends not so much on having superior technology at hand as on understanding the limits of any given technology, and on finding a way in going around those limitations . . . dependence on technology inevitably creates vulnerabilities that an intelligent enemy will not be slow to exploit."[50] The issue of faith in the systems capabilities should be of great concern; staffs and commanders that do not understand how their soldiers use systems to prepare their information/presentations and lack confidence in their abilities to conduct the analysis need to observe more subordinate training. As the Army is fielded with more systems, this uncertainty and inhibition will become tempered as soldiers and leaders become more familiar and consequently trust the information being presented by ATCCS.

Analysis remains a requirement of the battle staff. The battle staff is a combination of subject matter experts in their fields that can best determine the implications of the information being seen in the new visual decision making environment. ABCS systems were intentionally designed to have built in filters or inhibitors that determine how information is depicted. These filters can be scaled or adjusted to aspects such as the level of command to the enemy order of battle. The battle staff 's personal traits and inhibitions can influence how the filters are imposed. Making

the Relevant Common Picture (RCP) relevant to the commander and battlespace is the challenge. These filters tend to show the inhibitions of the commander and staff by controlling the information that is depicted on the screen. Personal biases can play a part of the inhibitions being applied. The way one is taught or trained over time will affect the biases of the leader and ultimately the way in which the computer is filtered/inhibited. Experts tend to agree with Marshal (General George C. Marshal wrote that high level thinking skills we not necessarily God-given of acquired overnight) that short-term, skill-based training programs are not likely to have a large impact on cognitive capacity. Knowledge, skills and attitudes necessary for effective battle command develop over time.[51] For example, if a staff member is trained to view the battle with the "big picture" in mind and not so myopic perspective the tendency will be to maintain the screen view at a 1:250000 scale rather than a 1:50:000. A trained commander knows to teach his soldiers to maintain several different views of the same battlefield on ATCCS monitors. This is one simplistic way of explaining the application of ATCCS technology. A classic ASAS example of inhibition at work is, when a commander is overly concerned about enemy reconnaissance assets he can inadvertently influence the staff in setting filters that look for recon signatures more than another more critical indicator. This can potentially have a negative influence on the outcome of the battle given certain conditions. "Both the MCS/P and the Applique have a filtering capability to show both friendly and enemy units as icons at any level from Corps- to squad-size or specific specialized assets. What these systems can do is collapse or expand the level of detail, from showing icons for individual vehicles, on up to battalion or brigade icons from the same RCP from

commands given by the operator of the workstation. Commanders need to see two levels down for both friendly and enemy systems, so operators must use the appropriate filter."[52]

TOC support. Though commanders do not fight from their TOCs, they do rely heavily on their TOCs to synchronize much of the battle. It is the TOC that ensures the routine coordination and decisions are being executed within the parameters of the commander's intent. The TOC's proper execution of the commander's intent alleviates inhibition. It is imperative that the brigade and battalion TOC maintain SA and continue to update and scale the RCP (Relevant Common Picture). With this increased awareness decision points within the battle are synchronized and acted upon in a more timely manner. It is this ability that will accelerate the enemy commander's decision cycle and increase his probability to falter. Once inside the enemy's decision cycle small success will be achieved and through success confidence in self and others is gained and human inhibition is reduced.

A well-functioning TOC enables the commander to expand his battlespace, which will allow simultaneous engagement of the enemy by various systems. Expanding the battlespace allows a commander to extend his reach and engage the enemy with a series of complementary engagements preceding the close fight. The long-range engagements should sufficiently tire the enemy so that the close battle will bring swift defeat. TRADOC defines battlespace expansion as achieving three distinct advantages over the enemy.

1. By a variety of reconnaissance means, identify, disrupt, or destroy enemy forces before they can effectively engage friendly forces.

2. Reduce friendly force vulnerability by increasing the dispersion and numbers of the friendly force. Physically mass only when absolutely necessary, but be capable of doing so rapidly and in varying combinations of combat, combat support, and combat service support.

3. Conduct maneuver by use of both fires and rapid physical mass and dispersion of ground forces to sense and dominate a greater battlespace and achieve a staying power effect (control) only possible with land forces.[53]

Summary

ABCS is truly making some important gains in situational awareness and information dominance. The findings have explained how commanders at the brigade and battalion levels exploit ABCS to achieve information dominance on today's conventional battlefield. The ATCCS are found to provide many advantages in MDMP. What is not certain from the materials available is the level of utility during execution and whether or not the combat arms can really achieve executing an OODA loop methodology of engagement with ABCS and increased SA. This work cannot determine the success or failure of ABCS in relation to the outcome of the battle. Some inferences are made in the materials found but no true research was found on the relationship of ABCS and execution of successful battle, more research is required.

The research indicates that ABCS can create periods of increased situational awareness and information dominance is being achieved however fleeting or transitory it may be. The new question that has been asked is, Should the commander act immediately upon the information or allow the battle staff to first analyze the situation

and wait for better information? If a commander in his accelerated decision process acts upon the information immediately, research tends to support that intuition in battle command is the prevalent factor and not the decision process per se. There is no material that the researcher found that measures the use of technology in conjunction with intuitive factors and measures there combined effects. Results show that as long as ABCS is confirming what the commander and staff believes then it is a complementary relationship. There exist examples to the contrary where technology did not support intuition and intuition prevailed with tragic results. Measuring the effect of intuition is a web of intrigue that requires more research in the area of information dominance, technology, and ABCS application. The human mind is much too complex for this study to determine all the affects of these tendencies on technology. The results from the AWEs and other experiments are largely inconclusive in the area of intuition and require further study.

The new problem faced by combat commanders is the lack of resources the commander has to influence the deep fight. The premise of complementary effects is based on the ability to strike the enemy deeper in succession. At the brigade level this is a problem because of the limited ability and range of deep strike weapons. ID alone does not allow the commander to defeat an enemy it requires new weapon systems that reach the deeper parts of the battlefield. Units need to be enabled to strike sooner than their adversaries and achieve initial surprise. Complementary effects become the primary driving forces for the brigade commander because he must engage the enemy throughout the depth of the battlefield.

The relationship between man's inhibitions and their affect on ABCS is both positive and negative. Inhibitions can be reflected on the systems but how often they are reflected and with negative results can not be determined here. As Force XXI evolves this will be an area requiring further study.

As one continues to return to the problem of information dominance and how it is achieved, its complexity entices the imagination leaving one wanting more. To have the ability to achieve more information on the battlefield than your opponent is as if one were playing chess with his opponent only being able to see half of the board, his half. Those who play chess will tell you that in this game, checkmate is achieved in fewer moves and with greater success in terms of greater lethality. There exists no greater pleasure to contestants than that of knowing what the adversary will do and making the call that defeats him, ID is our portal to this future environment.

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CHAPTER 5

CONCLUSION

Introduction

At the dawn of the new millennium, twenty-first century, the United States Army forges its future in information operations (IO). "I have seen the future of warfare . . . the Army's ability to use information to dominate future battles will give the United States a new key to victory, I believe, for years, if not for generations to come," so stated Secretary of Defense, William Cohen during a recent training rotation at the National Training Center.[1] Today, the uncertain world dictates that the Army become a capabilities-based force that can deploy anywhere in the world. A great part of this capabilities-based force is and will continue to be information technology dependant. Advances in information technology create conditions for an asymmetric and asynchronous warfare environment. Currently, the Army Battle Command System (ABCS) is the Army's answer for sharing information within this new environment. These systems are designed to share information among friendly units faster than ever possible allowing the U.S. Army to act faster than the enemy. This information sharing ability will provide the opportunity to operate inside the enemy's decision cycle with greater lethality. This information power in the hands of combat commanders provides increased situational awareness and information dominance.

Information technology has broken through the great barrier of the industrial age and is careening forward at uncontrollable speed with no harbor for the journey's end. Information technologies, such as ABCS and its associated networks of the tactical

Internet and Global Command, Communications, System, are the power for future warfighters. This researcher believes that ABCS is the seed that will produce future digitized systems and will gain information dominance for the commander of the future. This chapter infers how ABCS will provide the ability to communicate and share information real time in the future digitized decision environment. It provides thoughts on the simultaneity that highly mobile, extremely powerful forces require to win today and on the expanded battlefields of the future. Finally, it will address some shortcomings in Force XXI that currently prevent brigades' success on the battlefield.

Purpose

This study examined how combat arms commanders at the brigade and battalion levels exploit the ABCS to achieve information dominance on today's conventional battlefield. The research determined how commanders apply new technologically advanced tools to enhance their decision making. The study examined the application of Army Tactical Command and Control Systems (ATCCS) to determine how digital information is shared on the battlefield to gain information dominance. The research studied how increased situational awareness enhances decision making. Finally, the research examined the effect of inhibition and intuition during the interaction with the ABCS environment.

The Problem

Commanders throughout history of warfare have contended with making decisions about battle based on information gained about the enemy from reconnaissance, intelligence, and surveillance assets in time-constrained environments. Army leaders are

told that ABCS is the answer to gaining information dominance over the enemy in a ground conflict. If ABCS is the answer, Army leaders must understand how to exploit these systems to gain this dominance. Sun Tzu writes, "If you know the enemy and know yourself, you need not fear the result of a hundred battles."[2] Commanders have made decisions both good and bad dependent upon the credibility of the collection assets, timeliness of the information, the friction on the current battlefield, and their ability to process the information, as well as their courage, wisdom, foresight, and resolution. This research will determine how to exploit ABCS and enhance decision making for the future commander.

Research Method Used

The retrospective method of research was used to accomplish this task. The research period for ABCS lessons learned included 1997 to the present. Only select contingencies and campaigns beginning with Desert Storm were used for this work. Given the NTC and JRTC lessons learned were not well organized in terms of ABCS lessons captured the research focused on the digitally tested rotations, such as TF AWE and RFPI. The information from these rotations was used in an inductive manner associating lessons learned to other like battlefield conditions. The research limited its scope to gathering advantages gained through the use of ABCS technologies in rotational units. The researcher took the information at face value as written by observers at the CTCs; when an advantage was stated it, was counted as such. The researcher chose this measurement of advantage because there were so few experts in this field and the CTC observers were one of the limited expert sources available given the limited time.

For examples of intuition and inhibition affecting ABCS employment and performance the researcher used CTC lessons learned for evidence. The conventional definitions from classical military theorists such as Clausewitz and Jomini were used for measurement of inhibition and intuition

Exploiting ABCS for Information Dominance

How can commanders at the brigade and battalion levels exploit ABCS to achieve ID on today's conventional battlefield?

Expanding Battlespace. With VTC technology rehearsals will be run with staffs playing their parts from their distant TOCs. Bringing the leadership together for these planning activities is no longer required. With information dominance, TOCs can now spread out farther for force protection without having to worry about travel time for key meetings. "The battlespace has expanded in all three spatial dimensions;" writes Dr Michael Brown, "since the 1973 October War, for example, the area of the battlespace occupied by a deployed force of 100,000 soldiers has expanded by an order-of-magnitude in both depth and breadth. In part, this extraordinary expansion has been the result--directly or indirectly--of improved information flows."[3] The potential for simultaneity from an expanded battlefield is now possible. This simultaneity will allow brigades and battalions to plan, prepare, and execute missions from isolated pockets on the battlefield. If brigades can plan and prepare from distant locations in nonlinear configurations, then they can attack from similar locales. This evolution of nonlinear force application is the next step in fighting battles and engagements in the information dominant environment. As a result, Michael Brown, a distinguished retired Army officer at the Strategic

Assessments Center of Science Applications International Corporation states, "One of the major foci of combat in the Information Age will be efforts to control, perhaps even dominate, the information environment."[4]

The natural progression will have corps fighting divisions from nonlinear assembly areas or attack positions. This progression of nonlinear fighting will reach to brigade level. The Line of Departure will be an archaic control measure replaced by the Assembly Area Line (AAL). The new doctrinal standard will become uncoiling from secure assembly/attack positions. Boundaries between friendly units will be obsolete and axis or directions of attack common place extending from different directions focused on decisive points and centers of gravity. The framers of Joint Vision 2010 understood this when writing, "Adaptations to this increasingly lethal battlespace will be warranted. These adaptations are likely to take the forms of increased stealth, mobility, dispersion and pursuit of a higher tempo of operations among elements within the battlespace."[5]

Attacking an enemy from isolated pockets ensures surprise and economy of force. Smaller more powerful forces will be able to appear dormant on the battlefield while they continue to plan and prepare for battle the entire time not being sensed by the enemy. When the time is right the small force will awaken and strike its enemy where it is least expected delivering a crippling blow at the decisive point. The asymmetric implications of this type of battle are enormous. The future battlefield will be characterized with what is referred to as a "nester," and defined as units that are resting and preparing quietly for the next strike against the enemy. A sort of mid-to-high-intensity, guerrilla warfare tactic that advances, strikes, withdraws, and disappears based on the commander's intent. The

nester finds an area within the AO and begins planning and preparations; the entire time digitally connected to higher and the other nester units. At the predetermined time the nesters attack their adversary from different directions at different times, always keeping him off balance and upsetting his decision cycle. Imagine for a moment the power and adaptability this type of force brings to a fight. A force that can deploy, strike and operate independently anywhere in the world while still maintaining communications with higher. The force packaging abilities for mission specific requirements seems limitless and only constrained by weapons capabilities.

Decision-Making Advantage

What decision-making advantage(s) does ABCS provide for combat commanders at the brigade and battalion levels?

ABCS enables the commander to adjust the decision-making process with great effect. The effect is measured in increased speed of information flow and increased situational awareness towards achieving information dominance. Today, through the use of the tactical internet, one is able to share status reports on friendly units at near-real-time (NRT) speed. This NRT technology allows subordinate units to report their current locations and operational readiness to commanders who want to project earliest ready times. The commander and staff now can bring this information up on a screen within seconds and make projected decisions based upon current readiness status.

With this type of clarity comes increased Operations Tempo (OPTEMPO) and accelerated decision environments. Let us recall the outmoded way of operating; when commanders and staffs relied upon wing boards and manual status charts for unit status.

This decision-making process was slower but still accurate. The information that was provided was considered accurate; only the commander and staff had to rely on it for a longer period of time. With technology like ABCS the information is still as accurate but now it is updated more often and is provided in a more visual friendly form. These two improvements in information sharing will lead to missions being executed in a shorter amount of time with increased awareness through visualization. This breakthrough in technologically enhanced planning will change the way military decision making planning steps are executed. When all the "electrons are in alignment," writes Major Bradford Nelson, instructor at the Tactical Commanders Development Program, Fort Leavenworth, "commanders can video-teleconference, fax, E-mail and in near real time, consult with one another, receive guidance, provide situational updates and simultaneously reach common understanding of the higher commander's intent."[6] Innovations in it will create an accelerated combat environment requiring leaders that can adapt to change quickly. When commanders are assisted in visualizing battles their mental faculties are freed to ponder more important issues, such as concept of operations and scheme of maneuver, rather than wrestling with the mundane issues of what the effects terrain might be. Brigadier General Hall, in his latest research writes, "We are now able to display information through visualization to fit the thinking styles of individuals, whether the need be for sophisticated 3-D terrain visualization, 3-D visualization of friendly and enemy communications pipes and switches, or 2-D displays of maps with contour lines. Through technology, we can indeed collaborate and approximate the 'collective brain' that the Germans aimed for when they developed their

Great German General Staff."[7] Accelerated or shortened timelines allow the commander to decide when to act within a larger window of opportunity. The increased window of opportunity enables commanders to better achieve surprise and initiative.

The tactical internet and video-teleconference (VTC) whiteboard technologies have added a third-dimension to staff planning tools. The days when Army planners huddle around map boards with commands being called over radio nets are over. "Today we look for NRT video whiteboards to share thoughts and decisions on plans that are seen by all staff planners in different locations. This breakthrough in planning enhances MDMP steps one and seven, receipt of the mission and orders production. This breakthrough in technology enables staffs to conduct collaborative planning where ideas are shared and plans are worked together from distant stations and different echelons. . . . Drs. Dearth and Thomas agree "that IW (information warfare) is fundamentally an effort to influence or manipulate the flow of information from sensors or feedback mechanisms to the point of decision in an adversary's decision cycle."[8]

Not far away are the days when Tactical Operations Centers (TOCs) evolve to true VTC where entire staffs are interactive and all staffs speak face to face from distant locations. The near future will have division planners develop courses of action (COA) while brigade staffs watch from their respective TOCs and provide input on brigade capabilities based on the latest division planner's decision. This simultaneous planning ability will make parallel planning processes obsolete and accelerate the decision timeline greatly. The process of waiting for your mission and area of operations to arrive to begin working your COAs is obsolete because as you watched the plan being developed at

higher headquarters your specialist copied it to your unit's overlay database. No longer do staffs wait for liaison officers to return with higher headquarters' plans or for FAX machines to print orders, instead, File Transfer Protocol (FTP) sites on the Tactical Internet already have them. Operations graphics and orders can now be transferred digitally over the tactical internet to overlay tables and word processing databases. Collaborative planning environments are the future and deem steps one and seven outmoded. Brigadier General Hall explains the power of collaborative planning as, "We can collaborate within the confines of a location, or we can collaborate with people around the world, thanks to modern technology. Collaboration is the key aspect of understanding the relationships comprising chaos and complexity."[9]

The New Hierarchy. As technology increases the dated hierarchical organizational structures decentralize and become obsolete. Hierarchical structures remain only for chain of command and training purposes. Senior Army leaders will lose their grip on organizational force structures for command, personnel, and rank sake for decentralized control based on missions. The mission-specific chain of command will tailor the decision-making process to fit the organization. As the world observed in Poland, 1 September 1939, with new technology and tactics come new organizations. The Blitzkrieg tactic of punching through enemy lines deep and letting the infantry clean up the pockets of resistance introduced the first panzer divisions. As in the Second World War, our information technology will change the structure of our Army. Dr. Michael Brown, a retired Army officer working for Science Application International Corp., when examining the implications of the information warfare revolution writes, "The armed

forces must develop operational concepts and organizational structures that are not only capable of fighting for superiority in this new environment, but are also proficient at fighting in it--of taking advantage of the enemy's mistakes in the information space and of capitalizing of friendly successes."[10]

The future organization will not be the central focus of the fight; instead, its leaders and soldiers recognized as fighters and supporters will fall in on systems, equipment, and organizations that are created and dissolved based on mission requirements. The advent of temporary mission specific fighting organizations is upon us. This hierarchy will streamline the decision-making process once formed for a mission. As technology increases, the dated hierarchical organizational structures decentralize because they will become outmoded. "Hierarchical structure has been the hallmark of military organization," so state Dr. Douglas Dearth and Dr. Thomas Goodden, learned scholars in the field of information warfare, and add, "In the future, these hierarchical arrangements--and mindsets--will be challenged and to some extent replaced by arrangements that more resemble networks."[11] The intelligence Corp's tactical tailoring concept is the beginning of this type of force packaging. This is not the same as task organizing, where units are attached and detached, but units now are completely formed to operate independently in distant locales. TRADOC developers understood this phenomenon when they expressed, Consequently, traditional, linear battlespace divisions, such as close, deep, and rear place artificial and unnecessary constraints on combat power application. Additionally, nonhierarchical, internetted command structures have begun to replace hierarchical ones in the realm of battle

command.[12] The necessity of more economical means of packaging and deploying will drive the Army in this direction. This researcher would never ask units with long gallant histories to disappear, instead, units will continue to exist for identity and esprit representing the professionalism and grit they bring to the fight, this must never go away. These men and women of the profession of arms will not care about the idiosyncrasies of the equipment or leadership, but will fall in and perform their mission as they were trained in school and unit with unit pride and esprit.

Effect of Intuition

How does intuition affect the use of ABCS by combat commanders at the brigade and battalion levels?

Battle Command. "*Presence of mind.* This must play a great role in war, the domain of the unexpected, since it is nothing but an increased capacity of dealing with the unexpected." So stated Clausewitz and remains convention today as, "We admire the presence of mind in an apt repartee, as we admire quick thinking in the face of danger."[13] Man's mind and intuition remains the constant in this technological evolution of information warfare. Technology will be the great enabler for future leaders that will think and act faster than ever before seen. The greatness of a commander is measured by his ability to battle command; to visualize the impending battle and provide that vision to subordinates; to see both friendly and enemy action, reaction, and counteraction and the strategy behind each action; to synchronize units, weapon systems, and leaders towards achieving synergy in a common goal; and motivating soldiers and leaders to taking the initiative in final victory. Greatness in future battle command will be enabled through

advanced technology and systems like ABCS that reinforce a commander's intuition. These advances will increase situational awareness and gain information dominance honing intuitive skills, which will be the norm and not the exception in the next first battle. Retired, Brigadier General Huba Wass de Czege expresses it best when he writes, "The current Force XXI process is the beginning of a revolution in battle command. We will grow beyond the current challenges of integrating functionally 'stove piped' information systems. . . . Consequently, there will be far more information about 'ground truth'. . . . Commanders and staffs will learn to make decisions and plans faster than ever before."[14]

These systems will not solely be designed to fight conventional war but will be able to support guerrilla operations and urban conflicts testing the limits of commander's intuition. The 3-D displays will have flexible databases that can receive building architectural plans and display them for building-to-building combat operations. Underground maintenance and sewage systems will be available for databases through cooperation with city government planners to thwart terrorist attacks and standoffs. Technology, writes Air Force Lieutenant Colonel, Fredrick Strain of the Strategic Planning Division, Pentagon, "remains the major driving force behind the changing limits of the combat area. . . . Most professionals recognize current technology is once again dramatically expanding the range of these boundaries."[15] These small steps forward with ABCS today will reap great advances in future planning technologies. The leap forward to 3-D terrain is on the horizon for the military planners and will stretch the capability of intuitive skills.

With expanded battlespace comes the requirement to visualize that space. Better visualization capability will enhance the commander's intuitive abilities to envision battle outcomes. Commanders will gain multiple views of the battlespace from different sensor platforms. Today civilian corporations like Playstation and Nintendo are foreshadowing what the military's information dominant future brings. The 3-D tour of the commander's battlespace is the next great step forward in Army After Next (AAN). The year 2010 and beyond, this researcher believes, will have 3-D terrain and combat systems wargaming for staffs and commanders during the planning phase of decision making. Staffs will program computer systems to visually display the results of their planning efforts for commanders to see and further visualize battle outcomes. Complementing this will be a real-time link from the reconnaissance effort during the planning process. The recon's real time link will update the wargaming application in time to show the commander the effects of the most current enemy situation. All this will be the Army's future and battle command will improve by orders of magnitude that we must prepare for.

These technologies will change the nature of battle command. Battle command, today, allows and requires commanders to be forward with subordinate commanders dictating the pace of battle. In the future, battle command will contend with an expanded battlespace, consequently, creating greater distances to travel to achieve the personal commander's touch. The nature of a commander's "personal touch" will change to one that will be given through a video screen. We see the migration in this direction today with the increased use of desk top VTC by senior ranking officers in order to save travel dollars and reduce temporary duty costs. The same will happen in battle, commanders

will reach out to one another and their soldiers through the use of expanded VTC technologies: Commander-to-commander VTCs from their respective TOCs and commanders to soldiers through large screen video. This is not to say that prior to the execution phase that senior officers will not visit soldiers and leaders in their tactical assembly areas, they will. During the preparation and execution phase on the expanded battlefield the VTCs will increase with senior officers riding with their main effort units while maintaining face-to-face contact.

Increased visualization through ABCS gets the Army one step closer to the OODA loop capability. Once fully fielded, ABCS will enable commanders to exercise some facsimile of the OODA loop concept. At the Company and below level the OODA Loop will be achievable with FXXI and ABCS technology because these forces will be able to operate autonomously if permitted. It is much more difficult to achieve this concept at the battalion and brigade levels because of the numbers of personnel and equipment required in maneuver. If these echelons are provided a highly mobile reserve force in the task organization then the OODA loop concept becomes more realistic. For example, if a brigade retains an attack helicopter company in reserve, the ability to see the enemy with ABCS combined with the accelerated decision environment, quick reaction time, and combat power capabilities of Apaches the Observe, Orient, Decide, and Act theory is realized.

Brigades and battalions are being fielded with ABCS systems that enable information dominance consequently, expanding their battlespace threefold. The brigade's expanded battlespace has increased from an organic intelligence 50 kilometers,

and engagement capable 30 kilometers to an intelligence 150 to 300 kilometers, and engagement capable 30 kilometers. There in lies the frustration and limitation to the expanded battlespace theory.

ABCS technologies give commanders increased capability in targetable intelligence capability but the inability to engage or influence that space still exists. This inability to engage at the greater distance defeats the theory that the smaller more capable information dominant force can defeat a larger force in expanded battlespace. Without an extended engagement capability to match the intelligence capability, forces will continue to meet at close range negating the synergistic capability of information dominance. The "Act" in OODA will remain as before and the superior force will continue to be measured by industrial age factors, those being amount of forces. The future brigade cannot become victim to the lesson learned that the 1997 Task Force Advanced Warfighting Experiment exclaimed, "Excellent EXFOR (Experimental Force) situational awareness can be negated by the OPFOR's (Opposing Force) superior knowledge of terrain and a high level of training."[16] The United States' Army will find it fighting on foreign soil against highly trained forces in the future and cannot afford this same lesson in warfare. The U.S. Army's future brigade must and will have weapon systems that match their intelligence collection capabilities thereby exponentially increasing the effects of complementary attacks and negating the adversary's home field advantage. Artillery will reach out to 100 kilometers with smart munitions--UAVs will carry ordinance to their high payoff targets (HPT) at ranges of 200 kilometers--antitank munitions will fly over

the inter-visibility line to targets identified by UAVs. All these capabilities will expand the battlespace and allow the smaller more capable force to win the next first battle.

Effect of Inhibition

How does inhibition affect the use of ABCS by combat commanders at the brigade and battalion levels?

FXXI and ABCS technology provides the commander 3-D and 2-D visualization tools that free the human mind to concentrate on more important matters on warfare while alleviating inhibitions. George Stein, Professor and Chief of the Department for Conflict and Change for Indiana University, writes, "The target of information warfare, then is the human mind, especially those minds that make decisions of war and peace and from the military perspective, those minds that make the key decisions on if, when, and how to employ the assets and capabilities embedded in their strategic structures."[17] The digitized map sets have replaced the two dimensional raster maps and complement the Maneuver Control System (MCS) and All-Source Analysis System (ASAS). This new capability now adds the effects of terrain visual capability that allow commanders and planners to see how their weapon and collection systems are affected. No longer do commanders worry about the effects of systems given the conditions of a particular battlespace. The ability to determine Line of Sight (LOS) characteristics during planning is a great step forward and partially reduces the requirement for early ground reconnaissance.

During execution ABCS provides the commander a far greater capability of eyes on the battlefield. Unmanned Aerial Vehicles produce the commander a 3-D image at critical points of the battlefield during the engagement. They provide friendly fire

support assets highly accurate targeting capability and observed fires without putting soldiers in harms way. The use of Enhanced Position Location Reference System (EPLRS) linked with Maneuver Control System- Phoenix provides the commander friendly unit locations throughout the battle. This visual display allows commanders to visualize their next move and orders in adjusting friendly postures and orientations based on enemy actions. This capability enhances the commander's intuitive skills by reinforcing them with locational data never before realized. Knowing where friendly and enemy units are positioned through the Relevant Common Picture (RCP) reduces the unknown or inhibitions that commanders used to have to factor in during decision making.

The future commander will be forward in a command vehicle--surrounded by miniaturized status monitors feeding--friendly and enemy situation updates while executing battle. The onboard computers will have active predetermined filters/alarms -- established during the planning process the alarm will alert the commander of CCIR (Commander's Critical Information Requirements) being answered as they are discovered. The commander will have the ability to change video feeds to get different views of the battlefield as fed by the Inter-vehicular Information Systems (IVIS) of various units within the command. On board VTC in command vehicles will enable the face-to-face contact that is required in combat between commanders and primary staff. The future battle execution environment will be highly accelerated and realization of the OODA (Observe, Orient, Decide, and Act) concept will be achieved.

The concept of truth with the introduction of information technology is changing. The Army will have difficulty in keeping pace with corporate producers and will fall behind each day. Professor Alan Campen, manager of AFCEA writes, "It must be recognized that a highly competitive industry facing unnerving, unpredictable changes in technology and uncertain markets for its enormous investments." The Army must do its best to maintain pace with information technology and keep its soldiers well equipped.

Recommendations for Further Study

The following recommendations pertain to the information dominance problems identified in this thesis that could not be addressed fully and merit further examination. They represent issues outside the scope of the thesis or the researcher's capability but are pertinent to the issue of information dominance and digitized technology's influence in decision making.

1. How much are conditions in battle command enhanced by ABCS technology? Can the effects of technology be measured pertaining to conditions such as surprise, initiative, decisiveness and others. Data must be collected then examined to measure the relative value of technology in battle command. Maybe this is an intangible area that cannot be measured but the Army must try.

2. How much information can a commander and staff really process? Computer systems today are providing an enormous amount of information that cannot be processed by the brain. The Army needs to determine the level of information commanders can process in each phase of the Military Decision-Making Process. Only then will the

developers of new systems know how to better program the filters and alarms that inform key personnel. Knowing the correct amount and type of information is important.

3. What conditions on the battlefield negate the information dominance advantage? The Army is learning how to gain information dominance but it focuses little effort on those areas that take it away. What type of information operations are directed against our collection systems that will either defeat information dominance or confuse/deceive it in times of conflict? We know more about how to gain information dominance than we do on how to lose it.

Summary

ABCS technology does provide brigades and battalions information dominance on today's battlefield. The decision-making advantages it provides grow each day a unit trains with the systems. Each time the brigade fights in the field or in simulations with ABCS the information dominance delta grows larger in our favor. Though no substantial empirical data exists, this researcher is convinced from readings and personal experiences that inhibition is lessened and intuition enhanced with ABCS technology support. The future battlefield will be expanded due to smart munitions and will require for its support better information systems.

Our adversaries are aware of the Army's information technology advantage and will attack it given opportunity and cause. The application of ABCS technologies against us may also prove surprising. Our adversaries will have an independent will, some knowledge of our capabilities, and the desire to avoid our strengths and exploit/attack vulnerabilities. The U.S. must remain vigilant and thwart the future assailant.

ABCS is that first great step that will get our Army closer to information domination and we must take it. This work has complied many of the positive applications of ABCS technologies and has provided some of the caution that is inherent to these environments. This is not an all inclusive body of work merely a guide for future commanders operating in the digital environment.

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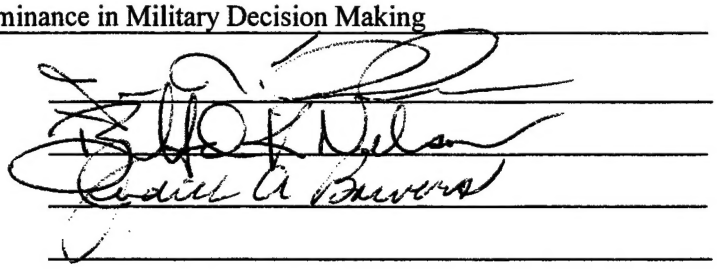

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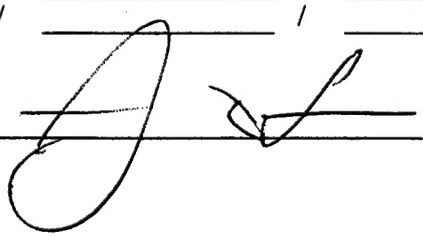

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